

California Fish and Game.

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

GAME CONDITIONS IN GREAT BRITAIN VS. CONDITIONS IN CALIFORNIA.

By CARL WESTERFELD, Member California Fish and Game Commission.

The SAN FRANCISCO EXAMINER, in its editorials entitled "Breeding Game in Scotland," published July 31, 1915, and "New Proof of Our Game Law Folly," published November 3, 1915, commends to the "prayerful consideration of the Fish and Game Commission the study of game conditions under the Scottish practice of breeding and killing game."

We were already familiar with game conditions prevailing in Great Britain, but in order to refresh our memories we took some pains to review the game laws and conditions of that country.

We are indeed surprised that the EXAMINER, which has hitherto so severely criticized the gun clubs and game preserves of California, should now suggest to Governor Johnson the upsetting of "the entire project of conserving game for the few and substituting for it the honest, well-established method of conserving it for the many," as practiced in Scotland. The preserve system which the EXAMINER has so bitterly condemned flourishes to a greater extent in Great Britain than in any other country. There a few of the nobility and millionaires own all the land where game is found and only these men and their friends are permitted to hunt.

On examining the "game conditions under the Scottish practice of breeding and killing game" we find at the very outset that the game laws of Scotland and those of the United States rest upon entirely different foundations. In America the wild game belongs to the people in their sovereign capacity and is not subject to private dominion to any greater extent than the people through the legislature may see fit to make it. (Geer vs. Ct., 161 U. S. 519; Ex parte Maier, 103 Cal. 476; Kellogg vs. King, 114 Cal. 388.)

On the other hand, in Great Britain there has been grafted much legislation upon the rules of the common law "which up till the end of the eighteenth century was framed for the preservation of deer and game for the recreation of persons of fortune and of preventing persons of inferior rank from squandering, in pursuit of game, time, which their stations in life required to be more profitably employed." (XI Encyclopædia Britannica, 11th edition, p. 440.) The right to take game was made to depend on the social rank of the person. Even now in Scotland the right to hunt is theoretically reserved to persons who have inherited that unknown quantity, a "ploughgate of land." (Scots Act 1621, c. 31); and in Ireland qualifications by estate are necessary for killing game and keeping sporting dogs. (Irish Act 1698, 8 Will. III, c. 8.)

In Great Britain, where the right to take deer and game is not in the crown by prerogative, or by franchise (*ratione privilegii*) in the grantee of the rights of chase, park or free warren, which are anterior

to and superior to those of the owner or occupier of the lands over which the privilege has been granted, "the right to take or kill wild animals is treated as a profit incidental to the ownership or occupation of the land on which they are found, and there is no public right to take them on private land or even a highway, nor is there any method known to the law where the public at large, or an undefined body of persons, can lawfully acquire the right to take wild animals *in alieno solo*." (XI Ency. Brit., 11 ed., p. 440; The Laws of England [The Earl of Halsbury] Vol. 15, p. 212.)

To preserve this right to the owners or occupiers of the land the most drastic trespass laws have been enacted in Great Britain. A trespasser on another man's land in pursuit of game renders himself both criminally and civilly liable. In a criminal action the penalty for trespassing on the land of another in pursuit of game is very severe: if done in the day time the offender is liable to a penalty of £5. If the trespassing is in search of game or rabbits in the night time the maximum penalty on a first conviction is imprisonment with hard labor for not over three months; on a second, imprisonment with hard labor not over six months. For the first or second offense the conviction is summary, *i. e.*, without trial by jury, subject to appeal to a court of session, but for a third offense the offender is tried on indictment and is liable to penal servitude from three to seven years, or imprisonment with hard labor for two years. If the offenders assault or offer violence by firearms or offensive weapons they are liable to be indicted, and on conviction punished to the same extent as in the last offense (The Night Poaching Act 1828, 9 Geo. IV, c. 69). In 1844 the above penalties were extended to persons found by night on highways in search or pursuit of game. If three or more trespass together on land by night, or destroy game or rabbits, and any of them is armed with firearms, bludgeon or other offensive weapons, they are liable to be indicted, and on conviction sentenced to penal servitude, from three to fourteen years, or imprisonment with hard labor for two years (Act of 1828, Sec. 12; Act 1831, Sec. 34). The Game Act of 1831 gives lords of manors and privileged persons certain rights to appoint gamekeepers with special powers to protect game in districts over which their rights extend. (Sec. 13, 14 and 16.) It is not necessary in Great Britain for the owner to summon a public officer in order to make an arrest for trespassing in pursuit of game. This may be done by *the owner or occupier of the land, his servants or gamekeepers*. Even in the Night Poaching Act of 1844, which applies to highways, the arrest of offenders is made by owners, occupiers and their gamekeepers.

The term "game," as defined by the Night Poaching Act of 1828 and the Game Act of 1831, includes pheasants, partridges, red grouse, bustard and hare. Deer are considered even more sacred than game. It is a *felony* to hunt or kill deer in enclosures, in forests, chases or purlieus, or in enclosed land where deer are usually kept, or after a previous conviction to hunt or kill deer in the open parts of the forest. (Larceny Act 1861.)

These are the laws which the EXAMINER so prayerfully commends to the consideration of the Fish and Game Commission. Does the EXAMINER advocate the adoption of similar laws in the State of California? Is this the EXAMINER'S "honest, well established method of conserving (game) *for the many?*"

As a result of these laws game and deer in Great Britain are most carefully protected by the owner or occupier of the land. Pheasants, partridges and other game birds and deer are reared artificially in great numbers, very much in the same manner as poultry and cattle are reared in California. The laws of Great Britain guard the interests of the land owner in game and deer so well against poaching that it is to the financial interest of the owner to protect it.

In many parts of Great Britain the importance of the sporting rights of an estate now more than counterbalance its agricultural value, and enormous sums are annually devoted to the artificial production of game. Taking all contingent expenses into consideration, the average cost of every head of game killed (this does not include deer) may be taken as not less than three shillings. A hand-reared pheasant can scarcely be brought to the gun for less than seven or eight shillings; and these birds in particular—the partridges and wild ducks to a lesser but steadily increasing extent—are reared in tens of thousands every year. (XXIV Ency. Brit. 11 Ed. p. 995.)

The nobleman who kills over 1,000 brace of grouse or hand-reared pheasants in a single day, or 200 stags in a season, can not, of course, eat them all himself, and in order to lessen the tremendous cost of artificially rearing and protecting game and of maintaining his hunting preserve, he sends to the market the game he can not eat. Because of the value of the game to the land owner and his right to control the hunting of it on his property, limit laws are unnecessary in Great Britain. Every owner permits only such hunting as will not impair his breeding stock, just as cattle men or poultry raisers in California kill or ship only the surplus cattle or chickens to market and retain a sufficient number as breeding stock.

It is true as said in the EXAMINER "that although Scotland is a small and well populated country" and "although game has been hunted and killed in Scotland for hundreds of years" certain species of game are still plentiful. This is due to artificial propagation and the fact that owing to the rigid trespass laws only the owners or occupiers of the land are permitted to hunt. It is not true, however, that under the Scottish practice the "common people" are entitled to hunt, or that the game is preserved for them, nor is it true that the wild fowl is still plentiful in Scotland, or anywhere else in Great Britain. The natural wild fowl have been almost exterminated in Great Britain—"the districts are unhappily few and far between where even a moderate bag of edible wild fowl can be made nowadays." (XXIV Ency. Brit., 11 ed., p. 998.) Wild fowl are migratory and can not be kept upon any man's land except to a slight extent when raised artificially. The deer and game birds of Scotland too would have been exterminated long ago were they not so carefully preserved for the land owner and occupier, *i. e.*, the nobleman and the millionaire.

"Any person before he shall in Great Britain take, kill or pursue or aid or assist in any manner in the taking, killing or pursuing by any means whatever * * * any game * * * or any deer shall take out a proper license to kill game," costing £3 or \$15.00. (Game License Tax 1860.) Gamekeepers and servants who assist the wealthy sportsmen as gun bearers, beaters, etc., must under this act have a game license, but even including all these only 68,000 game licenses are issued annually in Great Britain and Ireland and the population of Great Britain and Ireland is 45,250,000.

In California with a population of 2,500,000 over 164,000 hunting licenses costing only \$1.00 apiece are sold annually.

If hunting licenses were sold in Great Britain and Ireland in the same proportion to the population as they are in California almost 3,000,000 licenses would be sold there annually.

In California one out of every fifteen men, women and children hunts, while in Great Britain and Ireland only one out of every 665 has that privilege. In other words, in proportion to the population, forty-four times as many people hunt in California as in Great Britain and Ireland. Evidently the "common people" do not have much opportunity to hunt under the Scottish system. Do these figures show that in California game is being conserved for "the few" and that in Great Britain it is being conserved for "the many"?

Neither grouse shooting nor deer hunting in Scotland is a poor man's sport. Mr. Grimble in his work "Deer Stalking and the Deer Forests of Scotland," p. 89, says: "In the two counties of Argyle and Inverness only and leaving Mr. Winans out of the calculation, there are a dozen deer forests which let at a total of £25,000!—an average of over £2,000 each per year. For practically two months' sport, a rental of £250 a week, or over £40 a day is paid. This sum does not include attendants' expenses, which sum sometimes amounts to very nearly as much again." And Lord Lovat in "Grouse in Health and Disease," p. XVIII, says: "It has been estimated that the approximate value of the grouse moors in Scotland is about £1,000,000 a year in gross rent, and in England not less than £270,000."

The total area of Scotland is 19,069,500 acres. Of this more than one-fifth, 4,000,000 acres, is devoted to deer forests, and these 4,000,000 acres are owned by less than seventy individuals, most of whom belong to the nobility and all of whom are extremely wealthy. The Duke of Sutherland alone owns 257,000 acres of deer forests in Scotland, the Duke of Fife 110,000 acres, and Lord Lovat 101,000 acres. Nobody is permitted to hunt on any of these lands without the consent of the owners. Less than seventy men therefore control all the deer hunting of Scotland. These men carefully conserve the game on their lands and but comparatively few men are invited to hunt. For example, the Duke of Fife, the owner of the Forest of Mar, consisting of 110,000 acres, limits the hunters to five a day and does not permit more than 200 stags per year to be killed. (Grimble, *Deer Stalking and the Deer Forests of Scotland*, p. 172.) So in the smaller forest of Glencalvey by Glenilsa, consisting of 3,000 acres, only one person per day is permitted to hunt during a limited season of two months, and the kill of stags averages about twenty-seven a year. (*Ibid.*, 209.) The author of the book, Mr. Grimble, in the preface, himself laments that he can no longer hunt in certain forests because the former owners (his friends) have died. He says: "* * * woe is me that I am unlikely ever again to spy their splendid corries, for, alas! the four kind friends who respectively held them in the days when I first wrote have all joined in the great majority."

It is the same with the hunting of grouse, pheasants, blackcock, partridge and all other game birds. Immense tracts of land which are rigidly preserved are owned by a few nobles and millionaires. Only they and their friends are permitted to hunt to the utter exclusion of the inferior classes.

The EXAMINER in its editorial of November 3, charges that "the deer are preserved for the rich sportsmen friends of the Fish and Game Commission." Let us examine the facts. The official railroad map of California, issued by the Railroad Commission of the State of California, showing the National Forest Reserves, shows that these reserves include the districts where the best deer hunting in California is to be had. They include nearly all of Trinity County and a large part of Del Norte, Siskiyou, Shasta, Modoc, Lassen, Plumas, Sierra, Nevada, Placer, Eldorado, Alpine, Tuolumne, Mono, Mariposa, Madera, Fresno, Inyo, Tulare, Kern, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Benito, Orange, Riverside, San Diego, Monterey, San Bernardino, Lake, Mendocino, Glenn, Tehama, and Humboldt counties.



Fig. 1. Map of California showing National Forests, in which, with the exception of those forming game refuges, hunting is free to all. The National Forests in California comprise 19,000,000 acres. (Courtesy United States Forest Service.)

In all there are almost 19,000,000 acres of land included in these forest reserves and there are over 21,000,000 acres of government land outside of the reserves, making over 40,000,000 acres of the best deer country in the State of California, owned by the United States government, upon which any citizen may hunt by procuring a license costing one dollar. None of this land is, or ever can be "preserved for the rich sportsmen friends of the Fish and Game Commission." As a matter of fact there are very few acres in the State of California which are preserved for the purpose of hunting deer. A few clubs exist for that purpose in the counties of Marin and San Mateo, but elsewhere in this state they are practically unknown.

The people of California have, therefore, government lands equal to twice the area of Scotland on which to hunt deer, besides all the land which is privately owned and upon which hunting by the public is permitted.

Practically the same method of conserving game as that practiced in California is followed throughout the United States.

In estimating the whole number of hunters in the United States we arrive at some astonishing results. In an article in the Saturday Evening Post of November 13, 1915, it is said:

"Covering the year 1913—the latest available in view of the conflicting dates of the several fiscal years—the association's report (American Game Protective and Propagation Association) shows that two million three hundred and twenty-five thousand shooting licenses were issued by the several states. It is estimated that in the year 1915 this number will exceed two million five hundred thousand. It is concluded that a million men hunt who are exempt from license requirements. In addition to these legal exemptions it is likely that more than a million men evade the law and hunt illegally.

"Taking figures and estimates combined, it seems fair to suppose that there are five million hunters in the United States. This is also about the estimate made by the Department of Agriculture.

WHAT AMERICAN HUNTERS SPEND.

"Of shotgun ammunition alone more than a billion shells are sold in the United States each year. (Retailing at about \$30,000,000.) There are thirty-five million clay birds or targets shot at every year in America (costing the shooters about \$500,000). There are five hundred thousand shotguns and rifles sold to sportsmen in America each year (bringing easily from \$10,000,000 to \$15,000,000). There are forty-five hundred gun clubs in the United States. On the whole, the outdoor sportsmen of America who do not confine their enjoyment altogether to proxy sports or commercialized sports—the men who at least have smelt powder—make a very respectable nucleus of military possibility. Rather let us call it efficient business possibility.

"The capitalization of American outdoor sports runs into very large figures. When we come to transportation, hotel bills, guides, equipment and so on, as required by the sportsmen tourists who hunt and fish, we run into very many millions of dollars."

There can be no question but what the training these men obtain in the pursuit of game develops the very qualities which make good soldiers. This training has been in the past and will be in the future a tremendous asset to the United States in the event of war. Colonel Roosevelt in the introduction to his work on "The Deer Family" at page 24 says:

"There are many sides to the charm of big game hunting; nor should it be regarded as being without its solid advantages from the standpoint of national character. Always in our modern life, the life of a highly complex industrialism, there is a tendency to softening of the fibre. This is true of our enjoyments; and it is no less true of very many of our business occupations. It is not true of such work as railroading, a purely modern development, nor yet of work like that of

those who man the fishing fleets; but it is pre-eminently true of all occupations which cause men to lead sedentary lives in great cities. For these men it is especially necessary to provide hard and rough play. Of course, if such play is made a serious business, the result is very bad; but this does not in the least affect the fact that within proper limits the play itself is good. Vigorous athletic sports carried on in a sane spirit are healthy. The hardy out-of-door sports of the wilderness are even healthier. It is a mere truism to say that the qualities developed by the hunter are the qualities needed by the soldier; and a curious feature of the changed conditions of modern warfare is that they call to a much greater extent than during the two or three centuries immediately past, for the very qualities of individual initiative, ability to live and work in the open, and personal skill in the management of horse and weapons, which are fostered by a hunter's life. No training in the barracks or on the parade ground is as good as the training given by a hard hunting trip in which a man really does the work for himself, learns to face emergencies, to study country, to perform feats of hardihood, to face exposure and undergo severe labor. It is an excellent thing for any man to be a good horseman and a good marksman, to be able to live in the open and to feel a self-reliant readiness in any crisis. Big game hunting tends to produce or develop exactly these physical and moral traits. To say that it may be pursued in a manner or to an extent which is demoralizing is but to say what can likewise be said of all other pastimes and of almost all kinds of serious business. That it can be abused either in the way in which it is done, or the extent to which it is carried, does not alter the fact that it is in itself a sane and healthy recreation."

The chief complaint of the EXAMINER seems to be that game is not as plentiful in our markets as in the markets of Europe. Game possibly would be plentiful in our markets if the shooting were limited as in England to the owner or occupier of the land on which it is found, but this would mean the adoption of the European system under which only the wealthy can hunt. Instead of five million hunters in the United States there would be about one-fiftieth of that number or 100,000. The poor man under the European conditions can not afford to hunt.

A supply of game in the markets would be of no particular benefit to the poor man because under ordinary conditions he could not afford to buy it. In thickly populated countries game always has been and always will be a luxury. It costs more than other meat because it is not so plentiful and is more expensive to raise. If at any particular time game has cost less than beef it was due to some unusual condition which was only temporary.

In California every effort has been made by the present Fish and Game Commission to have people engage in the business of raising game for the markets. One of the principal reasons for the establishment of the State Game Farm at Hayward was to instruct people how pheasants and other game birds could be raised artificially. Since the establishment of the game farm hundreds have been raising pheasants for the market and these birds can now be had in any first-class restaurant in San Francisco. In 1913, owing to the efforts of the Fish and Game Commission, the "Bowman Act" was passed, which permits the raising and sale in California of all kinds of hand-reared game. For several years past reindeer meat has been offered for sale in the markets and restaurants of San Francisco. Several men are now engaged in raising deer in captivity and hope some day to supply our markets with venison, but this will take time and the expenditure of much money. For example, under the "Scottish practice of breeding and killing game"

enormous sums have been spent in the raising of deer. A witness who was examined before the Royal Commission testified:

"I have planted 8,000 acres with twenty-four million trees, and that I am going on with as quickly as the season permits;

"I have put up more than seventy-six miles of my own internal fences, and I have joined with my neighboring proprietors in putting up more than thirty-four miles of march fence.

"I have made 473 miles of open drains; I have made over twenty miles of carriage road and more than eighteen miles of pony tracks and walks; the whole outlay I have made during twelve years has been £180,000, or an average of £15,000 a year spent entirely in the county!" (Grimble, "Deer Stalking and the Deer Forests of Scotland," p. 91.)

From this testimony it would appear that the raising of deer for sport or for the market is no small undertaking.

In no place, not even in Scotland, have game breeders had any success in hand rearing grouse or quail. The moors on which they are found in Great Britain are protected against trespassers, the birds are fed and the vermin are killed. All this is done there by the owner or occupier of the land and until the right to take or kill wild animals in this country is treated as a profit incidental to the ownership or occupation of the land on which they are found, no owner or occupier will bother himself much about the protection or propagation of the game on his land.

While private preserves often serve a most useful purpose and should be encouraged within reasonable limits, it would be a great misfortune if they increased to such an extent that all the available hunting ground fell into the hands of a few very wealthy men, as it has done in Scotland under the "Scottish practice of breeding and killing game."

In the United States millions of dollars are spent annually in the pursuit of game and millions of men find renewed health and strength in the exercise and outdoor life which it entails. The prohibition or curtailment of field sports is highly undesirable, both from the standpoint of economies and of health.

Furthermore, the great army of hunters forms a nucleus from which in time of need an army of soldiers could be recruited for national defense. For, as Colonel Roosevelt has said:

"The qualities that make a good soldier are in large part the qualities that make a good hunter. Most important of all is the ability to shift for one's self, the mixture of hardihood and resourcefulness which enables a man to tramp all day in the right direction and when night comes, to make the best of whatever opportunities for shelter and warmth may be at hand. Skill in the use of the rifle is another trait; quickness in seeing game, another; ability to take advantage of cover, yet another; while patience, endurance, keenness of observation, resolution, good nerves, and instant readiness in an emergency, are all indispensable to a really good hunter
* * *

"It is utterly foolish to regard proper game laws as undemocratic, unrepubli- can. On the contrary, they are essentially in the interests of the people as a whole because it is only through their enactment and enforcement that the people as a whole can preserve the game and prevent its becoming purely the property of the rich who are able to create and maintain expensive private preserves. The very wealthy man can get out hunting anyhow, but the man of small means is dependent solely upon wise and well executed game laws for his enjoyment and the sturdy pleasure of the chase.

"The game should be conserved so that it shall continue to exist for the benefit of all lovers of nature and to give reasonable opportunities for the exercise of the skill of the hunter whether he is or is not a man of means."

THE EFFECT OF STRYCHNINE SULPHATE ON CALIFORNIA VALLEY QUAIL.

By C. C. PIERCE, Senior Surgeon, and M. T. CLEGG, Bacteriologist,
United States Public Health Service.

For the past several years the United States Public Health Service has been conducting a campaign for the eradication of ground squirrels, in co-operation with the California State Board of Health. This work is being carried out under a state law, and on account of plague infection existing among California ground squirrels.

One of the methods used to destroy squirrels is to distribute poisoned barley over infected lands during the dry season. Barley is the only grain used for this purpose and was selected because the squirrels take it readily, while birds are not particularly attracted by the barbed grain, the spines not being removed in the cleaning process.

The government formula and method of preparing this poisoned barley are as follows:

| | |
|---------------------------------|-----------|
| Whole barley (re-cleaned)----- | 18 pounds |
| Strychnine sulphate ----- | 1 ounce |
| Soda (bicarbonate) ----- | 1 ounce |
| Saccharine ----- | 1 dram |
| Thin starch paste ----- | 1 pint |
| Corn syrup (Karo or equal)----- | 2 ounces |

Dissolve the strychnine in hot water; thicken with starch to about the consistency of thin soup. Dissolve the soda in one-half pint of hot water and add a little at a time to the poisoned starch until effervescence ceases; then add the syrup and saccharine, mix well and apply to the grain, stirring constantly until the poison is evenly distributed throughout, and the grain is thoroughly dry.

This formula is particularly advantageous on account of the fact that the bitter taste of the strychnine is delayed for several minutes and squirrels can pick up and place in their cheek pouches a considerable quantity before any bitter taste is noted; it is then too late for the squirrel to get rid of the poison, as enough of it has been absorbed through the mucous membranes of the cheek pouches to kill the animal.

Extensive experience with this type of poisoned barley has shown an efficiency far ahead of any other type of poisoned grain tested. Young or half-grown squirrels have, in most instances, been practically exterminated and the percentage of adults or full-grown squirrels destroyed is far higher than with other types of poisoned grain used.

At various times the effect which the extensive use of this poisoned grain might have upon valley quail has been questioned. The officers and employees engaged in squirrel eradication work have never observed any mortality among quail as a result of the poisoned grain. In order to give a definite and scientifically proven answer to the State Fish and Game Commission, the following experiments were carried out at the Federal Laboratory, San Francisco, to determine the minimum lethal dose of strychnine sulphate for the California valley quail, and further to determine what effect the poisoned barley, distributed under the direction of the United States Public Health Service for the destruction of the ground squirrels (*Citellus beecheyi*) might have upon the quail. It was found that of four quail tested, the minimum

lethal dose of strychnine sulphate given subcutaneously was four milligrams for each 100 grams of body weight.

TABLE NO. 1.

Showing the Minimum Lethal Subcutaneous Dose of Strychnine Sulphate for Quail Compared with Guinea Pigs and Ground Squirrels.

| Subject | Weight In grams | Dose in milligrams | Dose in milligrams per 100 grams body weight | Result |
|-----------------------|--------------------|-----------------------|--|------------------------|
| Quail No. 1----- | 150 | 2 | 1.3 | No symptoms. |
| Quail No. 2----- | 145 | 4 | 2.7 | No symptoms. |
| Quail No. 3----- | 148 | 4 | 2.7 | No symptoms. |
| Quail No. 4----- | 147 | 6 | 4 | Death. |
| Guinea pig No. 1----- | 381 | 4 | 1.05 | Convulsions; death. |
| Guinea pig No. 2----- | 201 | 4 | 2 | Convulsions; death. |
| Guinea pig No. 3----- | 362 | 2 | 0.5 | Convulsions; death. |
| Squirrel No. 1----- | 450 | 2 | 0.4 | Convulsions; death. |
| Squirrel No. 2----- | 530 | 0.5 | 0.09 | Convulsions; recovery. |

It will be noted that the amount of strychnine reckoned by body weight fatal for quail No. 4 was ten times greater than the fatal dose for squirrel No. 1 and forty times greater than that which produced convulsions in squirrel No. 2.

FEEDING EXPERIMENTS. USING PURE SULPHATE OF STRYCHNINE.

Forced feeding was carried out. This experiment, of course, does not show the amount of strychnine that would be fatal were they fed under natural conditions, as a certain amount of the strychnine was absorbed through the upper membranes during the process of feeding. Four quail were used. Six milligrams for every 100 grams of body weight produced convulsions but not death.

FEEDING EXPERIMENTS. USING POISONED BARLEY.

The barley used in these experiments was obtained from the contractor furnishing poisoned barley for the Public Health Service, mixed according to the government formula and containing 10 milligrams of strychnine sulphate to each 2.9 grams of weight, or 70 grains of barley. Four quail, the heaviest weighing 170 grams and the lightest weighing 153 grams, were fed varying amounts of the barley. The feeding time in one case was ten minutes. This quail consumed 70 grains of barley containing 10 milligrams of strychnine. Another consumed 140 barley grains containing 20 milligrams of strychnine during a period of twenty-four hours, and one consumed 280 barley grains containing 40 milligrams of strychnine during a period of forty-eight hours. In none of the quail were there any symptoms of poisoning.

In order to test the toxicity of the barley, four squirrels were fed the following amounts:

- 19 grains of barley containing 2.7 milligrams of strychnine.
- 30 grains of barley containing 4.3 milligrams of strychnine.
- 33 grains of barley containing 4.7 milligrams of strychnine.
- 40 grains of barley containing 5.7 milligrams of strychnine.

TABLE NO. 2.

Test to Determine the Amount of Poisoned Barley Fatal to Quail, Compared with That Fatal to Squirrels.

| Subject | Weight in grams | Number of grains of barley | Amount of strychnine sulphate (in milligrams) | Time consumed in feeding ¹ | Results |
|----------------|-----------------|----------------------------|---|---------------------------------------|----------------------------------|
| Quail A----- | 153 | 70 | 10 | 10 min. | No symptoms. |
| Quail B----- | 173 | 140 | 20 | 24 hrs. | No symptoms. |
| Quail C----- | 157 | ? | ? | 24 hrs. | No symptoms. |
| Quail D----- | 168 | 280 | 40 | 48 hrs. | No symptoms. |
| Squirrel A---- | 455 | 40 | 5.7 | 1 hr. | ² Convulsions; death. |
| Squirrel B---- | 440 | 33 | 4.7 | 1 hr. | ² Convulsions; death. |
| Squirrel C---- | 445 | 30 | 4.3 | 2 hrs. | Convulsions; death. |
| Squirrel D---- | 425 | 19 | 2.7 | 10 min. | ³ Convulsions; death. |

¹"Time consumed in feeding" designates the time occupied in giving the amount of strychnia indicated. Quail A had been starved for 48 hours; Quail B, C and D were fed on non-poisoned grain before receiving the poisoned barley. Cages were then cleaned of all food and a definite number of grains of poisoned barley were placed in the feeding pans.

²Convulsions occurred within thirty minutes after the poisoned barley was pouched by the squirrels, and death within two hours.

³Death occurred in one and a half hours.

In each case convulsions and death occurred within a period of two hours after administering the barley and in each case the barley was reclaimed from the pouch of the squirrel after death, showing what had already been proven, that strychnine is rapidly absorbed through the membranes of this organ.

CONCLUSIONS.

(1) California valley quail may be fed under natural conditions relatively large amounts of strychnine sulphate without showing toxic symptoms.

(2) The minimum lethal dose by subcutaneous injection is four milligrams per 100 grams of body weight.

(3) The California ground squirrel (*Citellus beecheyi*) is very susceptible to strychnine sulphate; .09 milligrams per 100 grams of body weight produced convulsions.

(4) Nineteen grains of barley containing 2.7 milligrams of strychnine sulphate, when retained in the pouch of the ground squirrel, proved fatal.

(5) Poisoned barley as used for ground squirrel eradication does not cause the death of California valley quail under natural feeding conditions.

FISHING AT SANTA CATALINA ISLAND—ITS DEVELOPMENT AND METHODS.

By DWIGHT G. FRENCH.

Probably at no other place, up to the present time, has the art of angling been given such a distinct and carefully worked out technique as at Santa Catalina Island, off the coast of Southern California, where, in the last fifteen years, its growth has been most rapid. The story of its development forms a very interesting chapter in the history of the piscatorial art.

In 1886 the waters off Catalina Island contained vast numbers of game fish. At that time there was on the island but one boatman, "Mexican Joe" who, with a large dory, took passengers for hire. All fishing was done with hand lines. It was necessary to go only two or three miles from Avalon, the town on the island, to make a good catch of tuna, albacore, yellowtail, white sea bass, and many other game fish. As Mexican Joe's trade increased others began to take up the occupation, but hand lines and row boats prevailed for many years, and little or nothing was done with the fish caught. Later a power boat, or launch, was introduced to tow boatmen, passengers and rowboats to and from the fishing grounds. As all fishing at Catalina is done by trolling, with the exception of black sea bass and rock bass, the more enterprising boatmen began to build their own launches and fish directly from these, trolling their lines behind.

In 1898 a grand leader and true sportsman, Charles F. Holder, founded the Tuna Club. With the founding of this club, rods and reels began to supplant the hand lines, for the Tuna Club offered prizes for the largest game fish landed on specified tackle.

Two distinct types of rods were specified, one known as heavy tackle, a wooden rod not shorter than six feet nine inches in length and weighing not more than sixteen ounces, the other known as light tackle, a rod not shorter than six feet over all, the tip, not including the butt, to weigh not more than six ounces. The line specified for the heavy tackle rod was a twenty-four strand line with a breaking strain of forty-eight pounds, that of the light tackle a line of nine strands with a breaking strain of eighteen pounds. Here also might be mentioned the tackle known as "three-six," the rod not to be longer than six feet over all and butt and tip to weigh not more than six ounces. The line is of six strands and breaks at twelve pounds. This latter class is not so generally used as the two described above.

No specifications were laid down with regard to reels. The reels first used had straight, stiff handles and leather thumb-drags, these drags being the only means of checking a fish's run. The reels held six hundred feet of the specified line. Following straight stiff-handled reels came an adjustable friction drag attachable handle. Its purpose was to do away with the leather drag as much as possible and act also as a saver of lines, for inexperienced anglers would often, in their excitement, press too heavily on the leather drag and so break the line. The drag handle once being set, all that remained to be done was to hold the handle until the fish had spent its run, then by a pumping process the line could be reeled in, ready for another rush of the fish. A 900-foot reel replaced the 600-foot one, for often 600 feet of line was not enough.

The 900-foot reel, with its adjustable friction drag handle, has been further improved by putting in a spring catch, so that the handle is caught or released at will. When the catch is released, the handle being caught, one can use both hands to pump and it is not necessary to use the handle except to reel in the line. Another type of reel has gained much favor, but as yet is not in general use. This reel combines the improvements described above, and in addition has a handle that locks at any position, and also a drag that can be adjusted to a given tension at any instant.

The seining and gill-netting operations of market fishermen at Catalina Island for a number of years past have so depleted the fish that it has become necessary for the boatmen who angle for sport to find some means to entice the fish to strike other than trolling the bait behind the boat in the old manner. The more naturally a bait can be made to act in the water the greater is the possibility of a fish striking. The yellowtail and the tuna are the most desirable of the game fish, consequently some improvement on the old method of trolling a sardine or flying fish had to be devised. When the yellowtail and tuna are feeding, sardines can be seen jumping on the top of the water and flying fish making their torpedo-like flight. Two very ingenious methods have been contrived for "jumping" the bait, the kite and the sled. The kite is the oldest and by far the most effective in its particular use, namely, in skipping the bait (a flying fish) for tuna fishing. (See sketch.) The originator of kite fishing is Captain George Farnsworth, one of the oldest boatmen and most experienced fishermen at Catalina. He claims to have used this method since 1909, but kept it a secret, pledging all of his anglers to secrecy before allowing them to use it, and then permitting its use only under his supervision and many miles away from chance spiers. In 1911 his secret leaked out through some unscrupulous anglers who, it is said, had given their word of honor not to divulge it, so that now the method is in more general use.

Two persons are required in the use of the kite, the boatman manipulating the boat and kite, the angler the bait. From 500 to 1,000 feet of kite line are necessary. The method of putting out the kite is as follows: The boatman puts the kite in the air and plays out about 200 feet of line or more, as circumstances require; a similar cord from ten to twenty feet in length is then tied to the kite line, and to the free end of this cord is tied a short piece of line that will break at about twelve pounds strain. The end of this line is then fastened to the wire leader of the angler's line. The boatman and angler then play out line together. In this manner the bait can be carried to any distance from the boat that is desired, the kite holding all lines clear of the water and allowing only the bait to touch the surface. On hooking a fish the light line between the kite line and the angler's line breaks, thus letting the angler free to fight the fish and the boatman to reel in the kite.

In the past three or four years several styles of kites have been tried and used. The first constructed were paper box-kites, but these proved of little value; they either pulled too strong and raised the flying fish from ten to fifty feet in the air, or else at the critical moment ceased to fly. Next followed the home-made kite, constructed of cloth, either thin muslin or silk. No glue is used in these kites, consequently they

are little affected by water. Two kites are necessary, one that can be used in a heavy wind, and one that can be flown in a very light breeze or by the speed of the boat alone. These kites must be so constructed and have such lifting powers that the bait is seldom raised more than three feet above the surface of the water. One can scarcely imagine the perseverance and patience Captain Farnsworth used in experimenting and constructing a kite to meet all weather conditions and yet be under perfect control, and one can not help lauding him, especially if they have had the pleasure of working with him one summer.

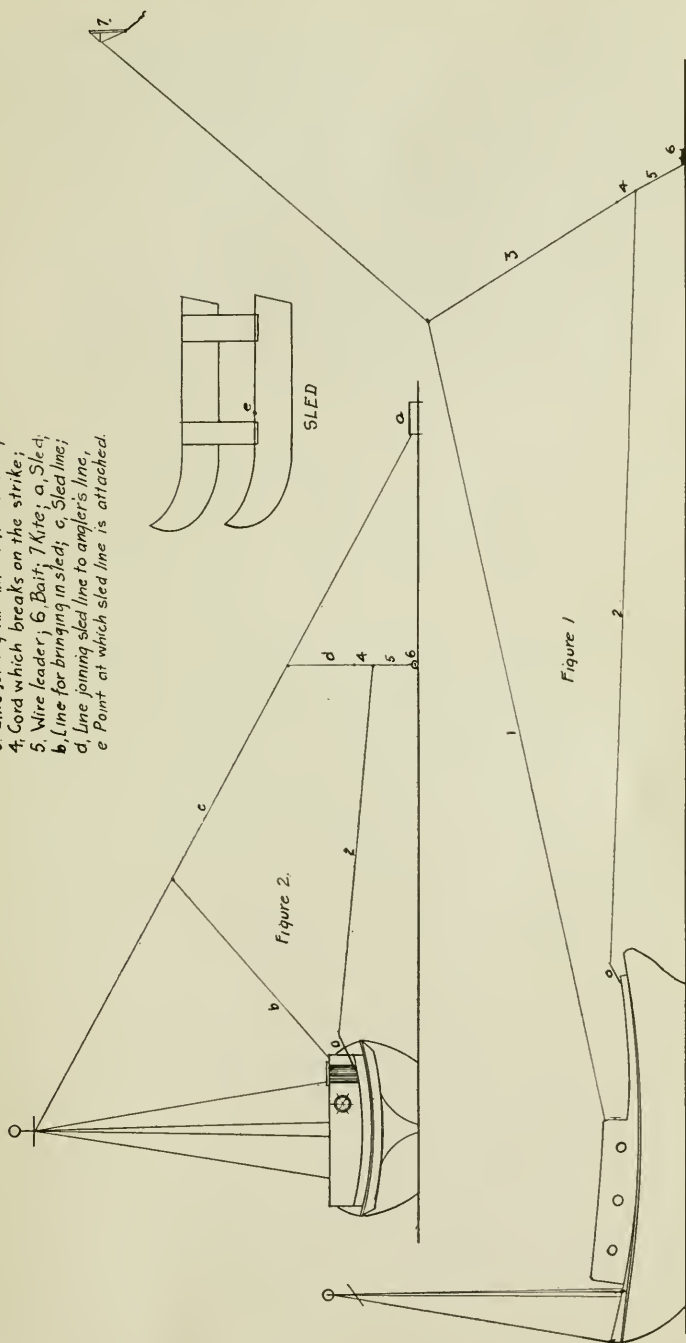
Often at Catalina tuna can be seen schooling on the surface when not a breath of wind is stirring. At these times it is practically impossible to get a strike by other means than with a kite or sled. At such times the no-wind kite, as I will call it, must be used. Most fishing launches at Catalina have a maximum speed of between seven and ten miles per hour, and going at full speed a kite, if properly constructed, will fly, but then almost directly astern of the boat. With proper maneuvering of the boat by turning, and the kite flying high enough, the bait can be carried off to the side and skipped over the school of surfacing fish. Only for a short period can this be done, however, for during the turning period the kite will begin to drop, and one must go ahead on it to cause it to raise. Let the slightest breeze come up and the no-wind kite will fly as nicely as could be wished. From the sketches (Fig. 2) it can be seen that there are no lines in the water, only the bait on the surface. With experience this bait can be made to skip and jump in the school of tuna, and to all appearances to act as if it were making frantic efforts to escape. The skipping is accomplished by raising and lowering the rod in a jerky manner. Tuna seem unable to resist these actions of the bait and often three or four will make their lightning-like strike for it. It matters not whether the bait is on the surface of the water or three feet above, they seem possessed with the mad desire to have the bait.

I have said nothing of the arrangement or location of the hook in the flying fish. This is very essential, for often the flying fish is struck and the tuna not hooked. The hooks used are of a distinct type, being about three inches long and one and one-half inches across the throat. The point of the hook points toward the shank to allow free hooking and yet as far as possible prevent unhooking. The using of two hooks is not advisable as often the tuna becomes bridled and the chances of landing him are thus lessened. One hook placed within two inches of the flying fish's tail, and the wire leader run through the body so that the fish will pull straight and by the head, seems to work the best. When feeding on flying fish a tuna generally strikes the head, it being necessary for them to swallow the fish head first so that the wings will not interfere. When the flying fish is used with the kite, however, the tail is nearest the water; consequently the hook is placed there.

When there is sufficient wind so that it is not necessary to run the boat to keep the kite flying, different tactics are used than when there is no wind. For illustration, let the wind be blowing from the west and the boat be traveling north, then the kite will be on the starboard or right side of the boat. A school of tuna being sighted, the boatman runs on the west side opposite the school, puts his helm to port and

FIGURE A. SHOWS KITE FLYING DIRECTLY ASTERN. FIGURE B. SHOWS SLED IN ACTION

- 0 Angler's rod, 1, Kite line; 2, Angler's line;
 3. Line joining kite line to wire leader;
 4, Cord which breaks on the strike;
 5, Wire leader; 6, Bait; 7 Kite; a, Sled;
 b, line for bringing in sled; c, Sled line;
 d, Line joining sled line to angler's line,
 e Point at which sled line is attached.



D.G.F.

Fig. 2. Diagram showing the use of kite and sled in tuna and yellowtail fishing at Santa Catalina Island.

stops. The wind being sufficiently strong to hold the kite up, the bait remains directly over the school; then by jerking the rod the bait can be made to dance.

I have given but two illustrations of the use of the kite, one under favorable conditions and one under poor. On paper these illustrations look easy to follow, but in actual use they are difficult to work out. Kite fishing is one of the best, most interesting and surest methods of causing tuna to strike; but only an experienced boatman and angler can manipulate the kite with continuous success.

The sled has been in use but a little over three years. Just who the originator was I can not say, there being some dispute. Its coming was not kept secret, neither was so much comment made at its initial appearance. The first year it was little used, as boatmen were rather skeptical of its value. The scarcity of yellowtail served, however, to give it prominence and showed that it had qualities that were at first underestimated. Only a general building plan of the sled can be given, because of all the sleds in use at Catalina no two are built alike. Each boatman seems to have his own idea as to the best. The sled has two wooden runners ranging from three to five feet in length and from six to ten inches in depth and about three-quarters of an inch in thickness. These runners are curved up at the front end, making about a 45° angle with the horizontal. At the rear end they are cut away slightly to leave as little wake as possible. The runners are held together by two braces, the under side of these braces being cut away toward the rear so as to assist in sliding over obstacles and through the water.

Using the sled does not require as much skill or experience as the kite, though two persons are necessary to work it to advantage. A line with a breaking strain of from 90 to 120 pounds and from 100 to 200 feet in length is run from the mast of the launch to the side of the sled, the sled thus pulling from the side (see sketch). When the launch is started the friction of the water on the sides of the runners causes them to act as a rudder, and the sled instead of running astern of the boat runs off to the side and a little abaft of the beam. By tying the sled-line to a different point on the runner the sled can be made to run more nearly parallel or more astern of the launch as desired. With a new sled the point at which it will run best is found by trial and the line always made fast to this point afterwards. A mast of reasonable height must be used, or the sled-line does not make a sufficiently large angle with the water. It can easily be seen that the taller the mast, the longer the sled-line can be and consequently the farther from the boat the sled can be made to run. The sled, like the kite, keeps all lines out of water. At some point about two-thirds the length of the sled-line from the boat a short piece of heavy cord is tied to the sled-line and on the free end of this cord is fastened a short piece of line which will break at about ten pounds strain. The light line is then tied to the wire leader of the angler's line. A hooked fish breaks the light line, leaving the sled on the sled-line and the fish on the angler's line. The bait used is the flying fish which, when skidded along on top of the water, the yellowtail will strike. For inshore fishing over or near kelp beds the sled has no equal, as the curved-up runners of the sled slide smoothly over the kelp without fouling. The yellowtail is an inshore fish and is seldom taken more than a half mile

off shore. For this reason the sled is best adapted for yellowtail fishing, the kite seldom if ever being used. The sled works best in smooth water or in water which is only slightly rough. In rough water or heavy swells it has a tendency to jump or dive, and as the speed of the boat is increased, these actions are more pronounced. When running in the trough of the sea the rolling of the boat and mast cause severe strains on the sled and sled-line. To eliminate this as much as possible a spring or heavy elastic cord is inserted at the mast. Because of rough water the sled is seldom used for tuna fishing, the kite being superior for all weather conditions met with in this branch of the sport.

In this article on the fishing methods in vogue at Catalina Island, an effort has been made to show something of the evolution that has taken place in salt water fishing at the southern island—an evolution which has brought the sport from the crudeness of hand-line days to the perfected art of kite and sled fishing with rod and reel and to a better utilization of the fish caught.

SCIENCE AND PROGRESS IN THE PROTECTION OF FOREST, FISH AND GAME ANIMALS.*

By DR. CHAS. C. ADAMS, Forest Zoologist,
New York State College of Forestry, Syracuse, N. Y.

I. INTRODUCTORY.

I have recently come to this State from the Middle West, where the sportsmen of New York State have the reputation of being among the most progressive, intelligent and public spirited men in the propagation, preservation and legal protection of fish, game and other wild animals. They have led the entire nation in their high standards of sportsmanship.

It is therefore with much pleasure that I have this opportunity to speak to such a representative audience upon a subject of so much importance and of so much interest to me personally. I wish to urge the desirability and necessity of investigating the forest, fish and game animals if we are to use intelligently the very exceptional animal resources which this State possesses. No other state equals or surpasses it in these features.

II. URGENCY OF INVESTIGATION OF THE STATE ANIMALS.

I take it that the most important practical problem is to execute all plans to the limit of our knowledge and to the best of our ability. This is so self-evident that I will not discuss it. The problem of next practical importance is to acquire new knowledge—an equally difficult matter. There are many reasons for this. There are fewer workers with the proper technical training, the personal rewards are generally less, and the investigator must not only wrestle with the problems he is attempting to solve, but he must also persuade others to furnish him with the means and support for his investigation, because he can seldom devote himself solely to investigation and support himself and family on the side or incidentally.

*A paper presented at the annual meeting of the New York State Fish, Game and Forest League, Utica, N. Y., December 10, 1914, and before the Anglers Association of Onondaga, Syracuse, February 8, 1915.

What are some of the problems awaiting solution in this State? As far as fish are concerned, listen to Dr. T. H. Bean, fish culturist of the State Conservation Commission, the best informed man on New York fish and a man whose reputation as a fish culturist is not surpassed in America. He says (16th Ann. Rep. Forest, Fish and Game Comm., pp. 137-138, 1911), "It is unfortunate but true, that the life of the inland lakes of New York, numerous and important though they are, is as little known as that of some of our remote possessions. New York ranks among the greatest of the states in the value of its fisheries and its waters contain undeveloped resources of unusual importance. We know little more than the names and spawning seasons of our common fishes. The interrelation of species in their effects, one upon the other, is almost a sealed book to us. In fish culture the state is occupied with only about thirty species, and these are under observation for the most part of the spawning season only. [There are about 150 species of food and game fishes in the State.] What is going on in the open waters of our streams and on the bottoms of our lakes is little understood, and yet it is of vital importance to the success of our work. The State ought to devote more time and money to the study of its natural aquatic resources. Such investigations would yield unexpected and most gratifying returns. It is time that the importance of the fisheries to the general public as well as to the angler was fully recognized and acknowledged."

When, as a new-comer in the State, I endeavored to learn what detailed studies of the fish had been made in our lakes and streams, I was soon impressed very forcibly with the truth of Dr. Bean's remarks. Much the same condition holds also for the game, fur-bearing and other forest animals. I do not wish to belittle the good work already done, but certainly we have no detailed study of the animals comparable with that which has been devoted to the geological survey of the State, nor with the detail that we have from some other states.

III. SAMPLE PROBLEMS NEEDING INVESTIGATION.

The following may be given as examples of some of the problems which need investigation:

1. What is the maximum crop of game and food fish which should be produced in our lakes such as in Lake George, Chautauqua Lake, or Oneida Lake?
2. How many grouse and quail should we secure from a given area of woods?
3. How many deer should we be able to secure from 500 acres of hardwood or coniferous forest?
4. To protect trees from insects, how many woodpeckers would it be desirable to have nesting in a square mile of forest?
5. What is the status of the red squirrel? Does the good it accomplishes balance the harm done?
6. Should garter snakes and water snakes be killed?
7. What is the extent, character of bottom, depth of water on the best breeding grounds for our most valuable lake and stream fishes? What is now being done to care for these grounds properly?

8. How do the different systems of forest management influence the abundance of fish in the included streams? How are the game and fur-bearing animals influenced?
9. How do the different types of storage reservoirs influence the fish productivity of such waters?
10. How do the various water power plants and their dams influence the fish in streams.
11. What is the influence of industrial waste, the sewage of cities, and similar products on the fish productivity of lakes and streams?
12. How can the abundance of suckers, gars, lampreys and ling be reduced in our waters? Our ignorance concerning these fishes is amazing. We can not subdue them and remain so ignorant of their habits. Knowledge is power under such circumstances.
13. Why are not frogs and turtles cultivated extensively in this State?
14. An exhaustive study has never been made of the animals in an American trout stream and who will say it is not worth while?
15. How can we control the epidemics among fish and game animals?

IV. NEED OF TRAINED INVESTIGATORS.

I wonder how many of you feel competent to undertake the solution of all the problems involved in these questions. I for one make no claim to this. This is not a one-man job, and to undertake such a program upon so small a scale is utterly unworthy of a state. If bureaus of municipal research are needed to solve the problems of our cities, many experiment stations are already at work on agricultural problems, surely forest, fish and game problems should be adequately handled by an able corps of technically trained investigators. Can men without adequate training hope to solve such problems?

We can profitably compare investigators to the spies, scouts and aviators of an invading army who bring in information about the enemy. Of course, an army can get along without them for a time and under some circumstances, but in this modern world, to ignore this assistance in military operations is to invite disaster. The State of New York has for years been conducting its campaign for forest, fish and game animals with little assistance from this kind of scout service. Is this wise?

The complexity of these problems awaiting investigation is well shown by Forbes (Bull. Ill. State Lab. Nat. Hist. vol. 1, p. 20) as follows:

"If one wishes to become acquainted with the black bass, for example, he will learn but little if he limits himself to that species. He must evidently study also the species upon which it depends for its existence, and the various conditions upon which these depend. He must likewise study the species with which it comes in competition and the entire system of conditions affecting their prosperity. Leaving out any of these, he is like one who undertakes to make out the construction of a watch, but overlooks one wheel; and by the time he has studied all these sufficiently, he will find that he has run through the whole complicated mechanism of the aquatic life of the locality, both animal and vegetable, of which his species forms but a single element."

This statement about the bass calls to mind the oft quoted statements from Darwin that the amount of clover seed in a neighborhood may be directly related to the number of cats in the vicinity. Speaking of

the dependence of the clover upon the humblebees in producing numerous seeds, he says (*Origin of Species*, N. Y. 1876, pp. 57-58): "Hence we may infer as highly probable that, if the whole genus of humblebees became extinct or very rare in England, the heartsease and red clover would become very rare or wholly disappear. The number of humblebees in any district depends in a great measure on the number of field mice which destroy their combs and nests; and Colonel Newman, who has long attended to the habits of humblebees, believes that 'More than two thirds of them are thus destroyed all over England.' Now the number of mice is largely dependent, as everyone knows, on the number of cats; and Colonel Newman says, 'Near villages and small towns I have found the nests of humblebees more numerous than elsewhere, which I attribute to the number of cats that destroy the mice.' Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district."

This quotation calls to mind the familiar story of our childhood about the "House that Jack Built." Only a moment's reflection upon the network of relations between the bass and other water animals and the bees, field mice and cats, will convince anyone that the network of relations existing between the fish, game and forest animals is an intimate and complexly balanced one. However, a technically trained investigator will take these complex problems, and perhaps after months and years of work, reduce them to such simple procedure that a two-dollar-a-day man will apply the results every day as a matter of routine; just as we vaccinate for typhoid fever, after the expert bacteriologists have solved the problems involved and reduced it to a simple routine.

CONTRIBUTIONS TO THE LIFE HISTORY OF THE PACIFIC COAST EDIBLE CRAB.

By F. W. WEYMOUTH.

[The British Columbia Fisheries Department has recently issued a report (Rep. of the Comm. of Fisheries for year ending Dec. 31, 1914, Victoria, B. C., pp. 123-129) which is of especial interest and value to California. The report is entitled: "Contributions to the Life History of the Pacific Coast Edible Crab (*Cancer magister*)" and is by F. W. Weymouth of Stanford University. The edible crab has a wide distribution, being found from Unalaska to Magdalena Bay, but it is not commercially important south of Monterey. The description of the fishing methods at San Francisco along with the observations under the headings, "Hoop-nets," "Habits," and "Soft Crabs," are of such interest that they are here given.—N. B. SCOFIELD.]

The hoop-net furnishes the method most widely used in commercial fishing, and the only one possible in "outside" fishing on bars and off sandy beaches where there is surf and strong tides, as at San Francisco, Eureka, and in parts of British Columbia. For these reasons it deserves a more particular consideration. As San Francisco furnishes the largest fishery of the coast, a description of the conditions at this port will serve as an example. Among the crab fishermen power-boats have completely displaced sailboats, though some of the latter are still used by the salmon fishermen. As all the fishing is here done outside

on the bar, where at times heavy weather is encountered, these boats are of necessity seaworthy craft. They are usually twenty-five to thirty feet over all, commonly of the "pinkie" or sharp-sterned type, though some of the Italian boats have the launch or rounded stern.

All the boats are partially decked over and provided with hatches, so that as used only a cockpit remains open, extending about amidships to near the stern. Under cover just in front of the cockpit is located the four- to eight-horsepower gasoline engine, and in some of the newer boats the steering wheel as well. Since the nets are hauled over the right side, this allows one man to control the boat and handle the nets. Such boats range in price from \$300 to \$500 for secondhand, and \$600 to \$1,000 for new boats. This with the equipment of nets and other necessary gear brings the cost to from \$500 or \$600 to \$1,200.

* * * [The net] is constructed on two iron rings; the upper, of about one-half inch rod, is two and one-half to three feet in diameter; the lower, of somewhat lighter rod, measures fifteen to eighteen inches. These are connected with rather coarse netting, so that the lower ring hangs about a foot below the upper, giving the whole a shape not unlike a deep dish. The lower ring is stiffened with six spokes, and to the center is lashed a hemispherical cap of woven wire to enclose the bait. The spaces between the spokes are covered with netting, which, like that on the sides, should be coarse enough to permit the escape of undersized crabs. The whole is attached by a bridle of three strands to a coil of stout line (from fifteen to twenty or twenty-five fathoms, according to the depth) which is made fast to a float. The float may be of cork, of hollow wood painted, or of copper. The cork is cheapest, but lasts only one season, and even when new is more easily swept under by strong tides. The hollow wood and the copper floats, though more expensive, last for many years if kept painted, and are more buoyant.

The bait consists of small fish of various kinds taken by seines in the bay. The amount used is not large and the fishermen seldom catch it themselves, being supplied by Italian seiners. The small fish are placed under the wire bait-cover already mentioned, which serves to prevent its being too rapidly eaten by the crabs, which might otherwise clear out the net and leave before it could be hauled.

The fishing is done on a sandy bar outside the Golden Gate in depths of from five to ten fathoms. Here the series of about twenty nets are thrown overboard as the boat runs slowly up against the tide, so that they form a line. The boat then drops back to the first net, which is hauled a half hour or more after being set. Where the tides run strongly it requires no little skill to manage the boat and haul the nets successfully, as the latter must not be stirred on the bottom until they are lifted completely or the crabs will be frightened away. To accomplish this the boat is run up against the tide, the float caught and lifted aboard, and the line carefully coiled in until the boat has reached a point directly above the net, when it is raised with a quick haul and drawn to the surface. The crabs are sorted, those of marketable size being thrown into a compartment in the stern and the remainder overboard. The boats usually go out to the fishing grounds early in the morning and are at work by sunrise. The nets are hauled at intervals of a half hour or more until the early afternoon, when the boats return, and the crabs are transferred to floating live boxes, from which they are later sent to market.

This method, with variations in the completeness of equipment and the substitution of rowboats for launches on more sheltered waters, furnishes most of the markets as well as private tables with crabs.

Habits.

In all the regions examined the crab is found in greatest abundance in shallow water on a sandy bottom, only chance individuals frequenting rocky or muddy bottoms. It ranges from low tide to a depth of fifty fathoms,* though its relative abundance at these different depths varies in different parts of its range. In California it is not taken in shallower water than about two fathoms, and practically all fishing is done at



Fig. 3. The edible crab (*Cancer magister*). The annual catch of crabs in California has a wholesale value of \$120,000.

from four to twelve fathoms, deeper water being avoided because of the labor of hauling the nets. On Vancouver Island and farther north, both in British Columbia and in Alaska, the crabs are found not only at these moderate depths, but also in shallower water, where they may be seen and taken with dip-nets or spears at low tide. Certain other species of crab enter shallower water in the northern parts of their ranges; for instance, *Cancer gracilis*, a species which is never fished, is common between tides in Puget Sound, though never found in less than five or ten fathoms in Monterey Bay. In the case of *Cancer magister*, however, this difference in habitat is apparently not the result of natural causes, but of continued fishing, which has depleted the most accessible grounds. This is shown by the history of the fishery. The following quotation pictures the condition about 1880: "The common crabs are caught along the sandy beaches on the San Francisco side of the bay,

NOTE.—*M. J. Rathbun. Harriman Alaska Expedition, Vol. 10, p. 177.

especially on the south side of the Golden Gate between the city and the sea. They are taken in immense numbers in seines, together with many shoal-water species of fish, yet the supply seems to be undiminished. Three or four good-sized crabs sell in the market at retail for twenty-five cents." Today no crabs could be taken by shore-hauled seines in the locality mentioned, and very few of marketable size by any method in any part of the bay; profitable fishing is confined to the bar three or four miles outside of the Golden Gate. One good-sized crab sells for twenty-five cents in the market on rare occasions, but more commonly for thirty or thirty-five cents. The supply seemed "to be undiminished" only because of the short time under observation. The history of this fishery, which even under protective legislation has markedly diminished in thirty years, is significant for yet unexploited regions.

At Eureka the course of events was similar. In early days in Humboldt Bay a skiff might be filled by spearing the crabs in shallow water with a pitchfork, where now bay fishing even in deep water is unprofitable. While found in shallow water, at least at one time, throughout its range, the edible crab is seldom or never seen between tides as are many smaller forms.

Cancer magister shows a distinct preference for sandy bottoms. Occasionally it is found in the fine sand or mud of bays, but such are always recognizable by their discolored appearance. It is found at times on gravel, but never, as far as I know, on rocky shores. This preference for a sandy bottom is correlated with certain structural peculiarities and a group of habits which may be briefly mentioned here on account of their bearing on the methods of fishing. Observation of the crab where accessible in shallow water and of the young in aquaria furnish the following facts: The crabs may often be seen moving quietly along over the bottom; where buoyed up by the water they move lightly over the ground on the tips of their legs, presenting a striking contrast to their heavy and clumsy movements as ordinarily seen on land. If frightened they dart away with surprising speed. Some of the fish eaten by them must require much agility in their capture, though how this is accomplished is unknown. For the greater part of the time, however, they lie almost entirely buried in the sand, as may be seen from observation in the aquarium or in shallow bays. If examined at such a time, only the stalked eyes, antennules, and antennæ will be visible, and below these a sort of chink between the anterior part of the shell and the flattened maxillipeds which are held slightly separated from the body. From this cleft issues a current, evident if the water is roily, or in the laboratory if India ink, for instance, be added.

When thus buried two conditions must be met: First and most important, a supply of fresh water for respiration must be obtained; and, second, the animal must be informed of the presence of food or enemies. Under ordinary conditions the water is forced through the gill cavity by the rhythmic beating of a specialized appendage lying in an anterior prolongation of the chamber; the water is drawn in near the bases of the legs and escapes near the mouth, forming the exhalent current already noted. When buried, the water must be drawn from the surrounding sand, but it must also be freed from fine sediment which soon coats the plates of the gills and interferes with respiration. If India ink be discharged on the surface of the sand above a buried

crab, it will be drawn into the sand along two lines corresponding to the front borders of the shell, and closer observation will show that it passes into a crevice between the shell and the large pincers which, when folded, accurately fit the contour of the sides of the body, here covered with a dense plush-like coat of hair. The teeth on the overhanging edge of the shell exclude large grains of sand, while the hair acts as a very efficient strainer, removing all fine particles from the inhalent stream. At times the direction of this current is reversed.

These facts explain certain of the habits. Other forms, though closely related, may lack this straining apparatus and thus be unable to burrow in sand; this is the case with *Cancer productus*, which, as a result, is restricted to rocky or gravelly bottoms. In the edible crab this straining apparatus, though efficient in removing the sediment found in the sand, seems less satisfactory in dealing with the finer particles of muddy bottoms, and crabs found in these locations have the gills badly discolored and seldom appear healthy. Other questions, such as food and the adaptation of the legs to sand burrowing, may have some influence, but the preference for sand is largely due to the method of respiration.

The second condition, that of information of possible food or enemies, is equally well met. The exhalent current constantly bathes the antennules, which are thus in a position to sample all the water drawn from the immediate surroundings or coming on the tidal currents from considerable distances. The antennules have been looked on as organs of smell, and though this has been questioned in certain quarters, experimental work which I have recently carried out (unpublished) leaves no doubt of the correctness of this conception. In the edible crab and in the other species tested they are clearly the most sensitive organs for detecting minute amounts of food juices in the water. *Hemigrapsus oregonensis*, a mud-loving species of this coast, will, for instance, go long distances up the small drain sloughs of the marshes to reach meat placed in the running water, but this reaction is prevented by the removal of the antennules, though the even greater injury of cutting off the stalked eyes has little or no effect. A crab buried in the sand will instantly come out in search of food when the current bearing the meat juice reaches it. On the other hand, the eyes appear to be of little use in food getting. Though quick to detect rapid movements, *Hemigrapsus oregonensis*, when moving over the surface of the mud left bare by the receding tide, will ignore food lying in plain view until the legs actually touch it. Moreover, at the depth of ten fathoms the amount of light is probably too small to make recognition of food possible, even if this were the habit in shallower water.

The bearing of the facts just presented on crab fishing is evident. On this coast all the forms of fishing depend on bait. The crab is reported among fishermen to be capricious, "biting" at certain times of tide or day and refusing to "bite" at others. Some fishermen believe that "bright" bait, by which they mean bright, silvery fish, is better, as it is more readily seen. This is undoubtedly an error, as sight plays little or no part in food-getting. On the other hand, the bait should not be dry, but with enough liquids to furnish juices to the surrounding water. The crab is exclusively carnivorous, and examination of stomach contents shows fish to be the most common article of diet,

with shrimps and small crabs next in importance. Fish would, therefore, form the most natural bait; its "freshness," aside from dryness, is quite secondary, as crabs are far from dainty, according to our standards.

At slack water the juices are diffused only a short distance and will attract few crabs; with the beginning of flood or ebb they are scattered far down current and eall the crabs even if buried in the sand. The stronger currents of later ebb or flood seem to drive the crabs to cover, though for what reason I can not say; possibly they are swept along unless they bury themselves. It is worthy of note that traps are being operated successfully at Boundary Bay without the use of any bait whatever.

"Soft" Crabs.

Cancer magister is never marketed in the "soft" or recently moulted condition, as is the blue crab (*Callinectes sapidus*) of the Eastern United States. In this respect it is similar to the edible crab of the North Sea. Since the question of "soft" crabs is often misunderstood, it may be well to point out the difference in this regard between the Pacific Coast species and the blue crab. "Soft" crabs are not, as often thought by the fishermen, a different kind or species of crab, but merely individuals which have "cast" or "moulted" their hard outer shells and in which the new shells have not yet hardened. This moulting is general among the crustacea. The hard shell, while it serves many important purposes, absolutely prevents growth. At intervals of about one year, in the case of the adult crab, the shell is cast, and during the few days before the new shell becomes calcified the animal undergoes a surprisingly rapid growth, increasing sometimes as much as a third in breadth, after which its size remains fixed until the next moult.

The blue crab of the Eastern United States is taken immediately after, or more often just before moulting, and kept in enclosures until it moults. It must be used for food as soon after shedding as possible, since the new shell rapidly hardens, and this, together with changes in the flesh incident to the rapid growth, renders it unsuitable for use. It is also used in the "hard" condition, but this is only after the shell has regained its hardness and the flesh has returned to its normal state after the period of growth. It is possible to obtain this crab in the "soft" state, because it is found in the shallow sheltered waters of such bays as the Chesapeake, where it can be taken by dip-nets or by dredges. At this time the crabs are defenseless and inactive, so that only these methods of fishing are effective—they will not come to bait. The edible crab on the Pacific coast, on the other hand, is taken on a commercial scale only by fishing with bait; hence no recently moulted individuals are obtained. When they are finally hard enough to enter nets they are the least valuable for food because of the changes in the flesh already mentioned. In consequence they can only be used when completely hard. Even if they could be obtained immediately after moulting it is doubtful if they could be used, as the blue crab is, for frying, since on account of the greater size of the crab the shell, even when softest, would be leathery and unpalatable.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.

January 15, 1916.

"If bureaus of municipal research are needed to solve the problems of our cities (many experiment stations are already at work on agricultural problems) surely forest, fish and game problems should be adequately handled by an able corps of technically trained investigators."—C. C. Adams.

DO WE WANT SCOTLAND'S GAME LAWS?

The SAN FRANCISCO EXAMINER persists in being antagonistic to the work of the California Fish and Game Commission and continually attempts to delude its readers as regards that most important subject, the nonsale of game. For instance, on November 3 the following note appeared among the editorials under the title "New proof of our game law folly":

"We wish to call the attention of the California Fish and Game Commission to this little note from the London 'Daily Mail':

Venison was on sale at four pence a pound at the Ladenhall Market yesterday.

"They have been killing deer in England for century on century—and yet they are able to sell deer meat to the people in the public market at four pence the pound. In California, where we have been killing deer in any considerable number only about sixty-five years, the people can not buy venison in the public mart at any price. To sell the venison is a crime. The deer are preserved for the rich sportsmen friends of the Fish and Game Commission."

The following quotation from an editorial appearing in the FRESNO REPUBLICAN clearly shows the untenable position taken by the EXAMINER:

"Once more the EXAMINER returns to its muddle-headed crusade in behalf of the poor who wish to buy pheasants in the St. Francis grill. This time it quotes a note in the London Daily Mail to the effect that 'venison was on sale at four pence a pound in the Ladenhall market yesterday,' and goes on to argue that 'they have been killing deer in England for century on century—and yet they are able to sell deer meat to the people in the public market at four pence the pound. London and Berlin sell pheasants in the open stall where all may buy. But in California the sick poor can not purchase a quail without danger of the constable and the jail.'

"It is, of course, true that they sell venison in London and pheasants in Berlin. But that venison is not wild game. There are no wild deer in England or in Germany, and have not been for centuries. When we raise game in California commercially, then we may safely sell it commercially. The wild game can not compete with commercialism. Venison at four pence a pound is too cheap, anyway. It cost the man who produced it several times that sum. If it is temporarily sold at any such price it is by some dumping process. But we can have game in California as a commercial product whenever we will go into the business of producing it commercially.

"Meantime, one of the interesting spectacles in the State will be the EXAMINER'S continuous argument in favor of the 'democracy' of game. The EXAMINER will continue to argue that the only thing which the poor possess is money, and that the only thing which is the monopoly of the rich is leg power and eyesight. The 'sick poor' who desire quails or pheasants could no doubt all have them if they were for sale for money. But if the only way to get a quail is to go out into the fields and shoot it, obviously the only persons able to walk far enough or shoot straight enough to get the quail are the rich.

"However, the poor have at least this consolation: The chief sport in hunting game is its elusiveness. The EXAMINER'S logic is quite as elusive—and you can

buy the EXAMINER for a nickel or read it free in the public library."

We are very glad to call the attention of our readers to an article appearing in this issue written by Mr. Carl Westerfeld, one of the Fish and Game Commissioners, in which attention is called to game conditions as they now exist in England and Scotland. No one, after reading this article, will desire to attain similar conditions for California. We want the game to be free to everyone, rich and poor, and we will always fight any proposition which delegates hunting privileges to a favored few.

It would be easy to write a long obituary, but not a short one, as I am requested.

His birthplace was Lynn, Massachusetts. Being the son of Dr. John Bassett Holder and Emily A. Gove, he was a direct descendant of Christopher Holder, who established in 1656, the first Quaker society in America.

His early education was in the Friend's School at Providence, Rhode Island. Although not closely connected in later years with "The Meeting," he was at heart ever a Quaker. The latest important work of his life, and a labor of love, was the writing of a book, "The Quakers

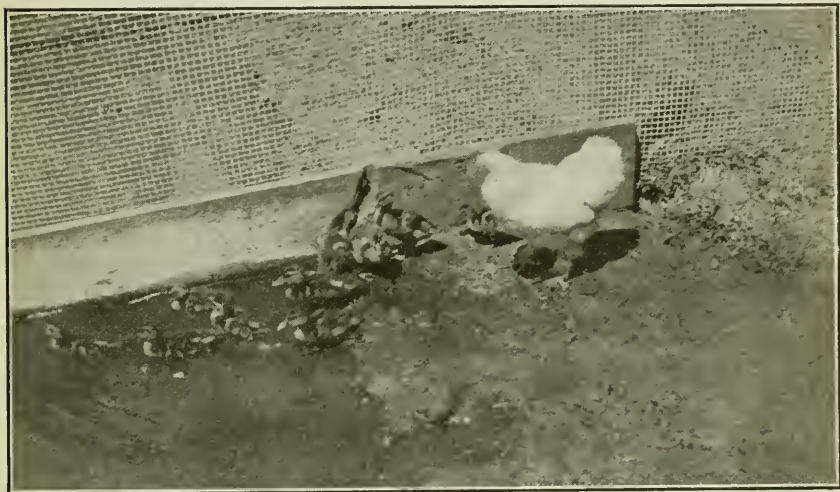


Fig. 4. The bantam eyes with displeasure her charge's fondness for water. Photograph taken at State Game Farm by W. N. Dirks.

FISH AND GAME DEPUTIES GIVEN INSTRUCTION.

In order to improve the warden service trained deputies are being sent out to work with resident wardens. An exchange of ideas is mutually helpful and better co-operation is certain to result. In this way also the new recruits of the patrol service are taught the "tricks of the trade."

DR. CHARLES FREDERICK HOLDER.

In the death of Dr. Holder October 10, 1915, at the age of sixty-four, the friends and guardians of animal life sustained an irreparable loss. He was a rare man.

in England and America," recently given to the booksellers. It is and probably will continue to be the best, well illustrated, condensed history of Quakerism to be found. It is a book for the library of every student of religion and sociology, every broad-minded lover of humanity.

Dr. Holder as a youth had passionate fondness for the water, and for the study of its various forms of life. He thought at first of being a seaman, and at the age of eighteen entered the United States Naval Academy. But he discovered before graduation that his scientific bent should take him in other directions. Two years later, 1871, he became assistant curator of zoology in the American Museum of Natural History in New York

City. In 1879 he married Sarah Elizabeth Ufford of Brooklyn, New York, who survives him. Five or six years later ill health compelled his removal to a different climate, and he came to California. By this move he obtained, as he stated in his last illness, a thirty year lease of life amid delightful surroundings.

And in this thirty year period he became a power, for education, for advancement of science, for social betterment, for advance of every good cause. He had initiative, and set on foot movements that others took up with enthusiasm and carried forward. He was so evidently honest, sincere, high-minded, so courteous, so dignified, so perfectly unselfish, that he won the confidence of all who knew him. The fact alone that he had espoused a cause was enough in the minds of many to claim attention and insure support.

It was largely his personal influence that secured in southern California a preponderating vote for the nonsale law in the last general election.

Dr. Holder was indeed a many-sided man; he wrote upon a variety of subjects, always writing well. He was a lover of play and took recreation religiously. To this he was greatly indebted for the prolongation of his life. His fishing trips, especially, formed the foundation for many charming magazine articles. "The Big Game Fishes of the United States" is one of the most popular books of its kind, and "The Fishes of the Pacific Coast" is the best handbook on Pacific Coast fishes on the market. Although his scientific books were of the popular kind, designed for tourists and sportsmen, they lacked but little in scientific accuracy. The first issue of CALIFORNIA FISH AND GAME contained an article by Dr. Holder on "Attempts to Protect the Sea Fisheries of Southern California."

But sportsmanship, of which he wrote so charmingly, was really a minor part of his serious life. If you doubt this, read the historical book first mentioned, and others. The list of his books, printed on the flyleaf of his latest, comprises thirty-two; and besides these he had made hundreds of contributions to magazines and newspapers.

I will repeat in closing a paragraph from an article written and published the day following his death:

"Dr. Holder was a man of the finest fiber, lover of all that is good, a hater of evil and despiser of shams. He will ever remain in the memory of those who knew him best as a type of the truest gentleman, a loving husband, a faithful friend, a patriotic citizen."—GARRETT NEWKIRK.

ARE WE COMING TO THIS?

A newspaper item in the SATURDAY News of Lewisburgh, Pennsylvania, states that the quail season opens October 15 and closes November 1. The limit is four birds in one day, ten in a week, and twenty in the season. Evidently both season and bag limit are down to a microscopic limit. Will twenty years more hunting in California bring this State to the same short season and small bag limit? The answer is "Yes," unless we profit by the experience of such states as Pennsylvania.

GAME FARM EXHIBIT AT EXPOSITION.

During the Poultry Show and the Children's Pet Show at the Panama-Pacific International Exposition there were on display a number of birds from the State Game Farm. Two cages contained different species of pheasants, while a third which attracted a great deal of attention contained mountain and valley quail and bob-white quail. Perhaps most attractive of all was a small pond on which were exhibited more than ten varieties of waterfowl, among which were mandarin and wood ducks and fulvous tree-ducks as well as all of the commoner species.

DEER RECEIVE ADDED PROTECTION IN CONTRA COSTA COUNTY.

The supervisors of Contra Costa County recently adopted an ordinance prohibiting the killing of deer and antelope within that county. The ordinance reads:

"Every person who pursues, hunts, takes, kills or destroys any deer or any antelope within the county of Contra Costa is guilty of a misdemeanor and upon conviction thereof, shall be punished

by a fine not to exceed five hundred dollars (\$500) or by imprisonment in the county jail for a term not to exceed six months or by both such fine and imprisonment."

No limit as to the length of this closed season was set. The increase of deer and antelope will alone decide when the season will again be opened.

PREDACEOUS BIRDS AND MAMMALS.

We hear it constantly said that the best method of increasing our game is to destroy predaceous birds and mammals. The people who make these statements

More game means more food for the enemies of game, and naturally an increase of them.

The argument is not that it is useless to destroy the enemies of game, but that this method of increasing game species is overemphasized. The hunter too often places the blame for the scarcity of game on hawks, weasels, skunks, etc., when the real blame should go on the hunter himself. So far as we can see predaceous birds and mammals do not greatly decrease any game species under natural conditions. The prime reasons why game is scarce is because too large a toll has



Fig. 5. Transporting cages of ring-necked pheasants for liberation at Lake Chabot, Alameda County. Photograph by W. N. Dirks.

fail to take into consideration that there are many factors which govern the increase or decrease of species and that the effect of predaceous birds and mammals is but slight in comparison with many other factors. Investigate conditions where game is most numerous and one will find that hawks and other vermin are also very abundant. Not only was game extremely abundant in early days in California, but predaceous birds and mammals were also abundant. There seems to be a balance established between the two.

been taken by the hunter and food and cover for game has been greatly reduced.

LEADING FISH AND GAME COMMISSIONS OF THE UNITED STATES.

On another page (p. 51) we print an interesting comparison of some of the leading fish and game commissions of the United States. Of course many of the comparisons are rather unfair because of the very different conditions existing in the various states. However, some idea

of the comparative size and the work accomplished by the different commissions is apparent. It will be noted that in a number of respects California is well in the lead.

**RING-NECKED PHEASANTS REARED
AT GAME FARM PLANTED IN
DIFFERENT PARTS OF STATE.**

Although no attempt was made to rear large numbers of pheasants at the State Game Farm in 1915, yet a number of birds have been planted in different parts of the State. Over one hundred ring-necked pheasants were liberated near Sac-

increased and there is every reason to believe that these new birds will also thrive. The very best protection is afforded them on the island and at seasons when food and water are scarce, these are supplied. About three hundred valley quail reared at the State Game Farm were liberated near the farm in Hayward.

**CALIFORNIA FISH AND GAME COM-
MISSION EXHIBIT IN PANAMA-
PACIFIC INTERNATIONAL
EXPOSITION.**

The California Fish and Game Commission and the California Academy of



Fig. 6. Ring-necked pheasants being liberated at Lake Chabot, Alameda County, October 11, 1915. A plant of fifty pheasants was made.

ramento and a like number in the river bottoms near Edgewood, Siskiyou County. Very favorable conditions exist in the latter locality and ranchers of the vicinity have promised to give the birds careful protection. Especially good results are therefore expected from this plant. The Santa Clara Valley was restocked in several places and seventy-five birds were sent to Calistoga, Napa County. Fifty pheasants were planted near Lake Chabot, Alameda County (see Figs. 5 and 6). In all 581 ring-necked pheasants were liberated.

As an experiment twelve golden pheasants, ten silver pheasants and forty-four valley quail were liberated on Goat Island, in San Francisco Bay. The pheasants placed on the island several years ago have

Sciences co-operated in installing a most striking exhibit of the game resources of California in the Palace of Food Products. Several habitat groups of game mammals furnished by the California Academy of Sciences were conspicuously placed in appropriate surroundings. Some desert mountain sheep on a mountainside, surrounded by cactus and sagebrush, and a family of deer resting in an open forest glade, formed the two most imposing groups (see Fig. 7). In a rocky cave a black bear watching her cubs at play could be seen, and in a similar den a mountain lion guarded her kittens while they fed upon a dead fawn.

A typical hunter's camp among redwoods appeared very realistic with its painted background (see Fig. 8). In the

camp were hung some of the different species of game birds, and tree squirrels and mountain bluejays perched in the trees overhead looked very lifelike. A glass case contained the common shore birds, and hanging on the walls of the booth, where attendants were on duty, were examples of practically all of the game birds of the State.

That living things are always more interesting than mounted specimens was demonstrated by the crowds attracted to

SQUIRREL POISONING AND VALLEY QUAIL.

The extensive poisoning operations carried on in our national forests by the United States Bureau of Biological Survey have not been instrumental in destroying game birds. For proof of this statement attention is called to the article on page 11. The following quotation from a letter from Dr. A. K. Fisher, in charge of economic investigations, United States Biological Survey, is also of interest:



Fig. 7. Desert mountain sheep group at exhibit of California Fish and Game Commission and California Academy of Sciences, at Panama-Pacific International Exposition. Photograph by Cardinell-Vincent Company, Official Photographers.

the aquarium containing trout. Some golden trout from the Whitney region, considered the most brightly colored of all the trout species, were on display for several months. Running water and an abundance of beautiful ferns surrounding the aquaria made this part of the exhibit particularly refreshing.

"In all our poisoning experience in California, our men have found no evidence of the poisoning of valley or mountain quail. Moreover, we never have poisoned any doves, except in one or two instances when wheat accidentally got into the barley, which we universally use for poisoning. In our prairie dog work

we use oats, and so far as I know it never poisoned any game bird. We occasionally kill a few horned larks, jays, and magpies."

WILD DUCK FOODS.

The United States Biological Survey continues to furnish valuable information regarding important wild duck foods. In a recent bulletin of the United States Department of Agriculture (No. 205) by W. L. McAtee, eleven different kinds of duck foods are described. A discussion of each plant and its distribution is given,

OUR ANNUAL CATCH OF FUR-BEARING MAMMALS.

The following table is interesting as showing the number of fur-bearing mammals killed in this State during 1914. The table is far from complete, not only because reports are at hand from but few of our national forests, but because the forest deputies reporting were unable to secure definite information. These incomplete returns, however, demonstrate the fact that in our fur-bearing mammals we have a resource which brings



Fig. 8. Hunter's camp, part of exhibit of California Fish and Game Commission and California Academy of Sciences at the Panama-Pacific International Exposition at San Francisco. Cardinell-Vincent Company, Official Photographers.

the value as a duck food is discussed, and a note as to the ease with which it can be propagated is added. This bulletin, along with two others previously published ("Three Important Wild Duck Foods," Bureau of Biological Survey Circular No. 81; and "Five Important Wild Duck Foods," United States Department of Agriculture Bulletin No. 58) will help any one interested in furnishing an increased food supply to our wild fowl.

many thousands of dollars into the State. If conditions are to improve, or even to remain as they are at present, added protection must be given the fur-bearers. The most needed legislation is a law protecting fur-bearing mammals during the summer season, when their fur is not prime, and one allowing but a short open season on the black bear.

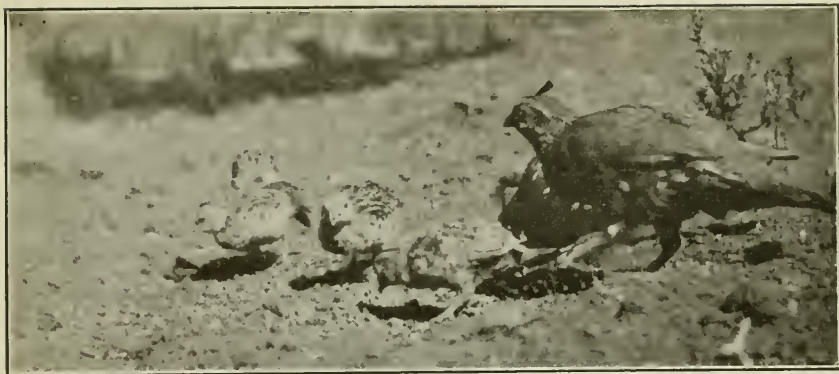


Fig. 9. Wild valley quail feeding in dooryard. Photograph by J. H. Gyger taken at Elsinore, California, August 1, 1915.

INCOMPLETE RECORD OF FUR-
BEARERS KILLED IN NATIONAL
FORESTS IN 1914.

| | Tahoe----- | Trinity (4 districts)--- | Stanislaus (2 districts)--- | Sierra (1 district)--- | Plumas----- | Klamath----- |
|----------------------------|------------|-----------------------------|--------------------------------|---------------------------|-------------|--------------|
| Mountain lion -- | 5 | 24 | 1 | 4 | ----- | ----- |
| Black bear ---- | 30 | 44 | 6 | ----- | ----- | *25 |
| River otter ---- | ----- | 9 | ----- | ----- | 2 | ----- |
| Fisher ----- | 10 | 37 | ----- | ----- | ----- | ----- |
| Marten ----- | ----- | ----- | 5 | ----- | ----- | ----- |
| Red and cross fox ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| Foxes ----- | 75 | 105 | 35 | 80 | 10 | ----- |
| Mink ----- | 5 | 41 | ----- | ----- | 10 | ----- |
| Weasel ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| Wildcat ----- | 5 | 114 | 25 | 65 | 28 | ----- |
| Raccoon ----- | ----- | 105 | ----- | ----- | 10 | ----- |
| Ring-tailed cat-- | ----- | 56 | ----- | ----- | ----- | ----- |
| Spotted skunk--- | 20 | 30 | ----- | ----- | ----- | ----- |
| Striped skunk--- | 300 | 230 | 62 | ----- | 70 | ----- |
| Coyote ----- | 100 | 131 | 19 | 25 | 68 | ----- |
| Badger ----- | ----- | 10 | ----- | ----- | ----- | ----- |

*In November, 1914.

SHORE BIRDS AND THEIR FUTURE.

The Yearbook of the United States Department of Agriculture for 1914 contains a paper by Wells W. Cooke, assistant biologist of the Bureau of Biological Survey, entitled "Our shore birds and their future." A discussion of the history and status of the important shore birds, the Wilson snipe, woodcock, and upland plover, and also of certain others of less importance are given. Particular emphasis is placed upon the great decrease in the numbers of these birds. In the

discussion of the Eskimo curlew the blame for its total disappearance is placed upon the hunter.

The following conclusions are reached: "It is evident that shore birds are an important asset in the country's wealth; that their recent decrease in numbers has been due principally to excessive shooting; that state laws have proven inadequate to check this diminution; that the only hope of preserving shore birds lies in federal legislation; but that with a wise federal law, wisely administered, and with an awakened and enlightened public sentiment to aid in its enforcement, there is every reason to believe that the shore birds will again become common enough to enliven the beaches and lake shores with their welcome presence and to afford the hunter a fair amount of legitimate sport."

GAME REFUGES.

According to the United States Department of Agriculture (Farmers' Bulletin No. 692) two national bird reservations have been created by executive order—one on a small island in Mille Lachs Lake, Minnesota, and one on Big Lake, in Mississippi County, Arkansas—and at least fourteen states enacted legislation affecting refuges for game. California established three large refuges in national forests; Idaho two refuges, one of which was stocked with fifty elk from Yellowstone National Park; Montana enlarged one of its refuges and decreased the area of another. Oregon abolished three

refuges, created two years ago, and Wyoming established one refuge and changed the boundaries of two others.

Illinois, Pennsylvania, and West Virginia authorized their fish and game commissions to enter into contracts for the establishment of game refuges on private lands. California already has such a law. West Virginia, lest too much land be set aside for the purpose, limited the area in any one county to ten thousand acres.

It can be seen from the above that interest is now centered in the game refuge as a factor in game conservation. Judging

California has shown little originality in its game laws. Instead of profiting by the experience of Eastern states she has followed along in their footsteps and now faces conditions which might have been averted had more originality been shown in the formulation of game laws.

VIOLETORS OF THE GAME LAWS.

In November, violators of the game laws in the vicinity of Los Banos, Merced County, fired upon deputies of the Fish and Game Commission. The deputies secured Winchesters and thereafter



Fig. 10. Members of National Association of Fish and Game Commissioners visiting State Game Farm at Hayward, California, September 9, 1915. Photograph by G. H. Graham.

from the reports coming from states in which game refuges have been established for a number of years, sentiment in favor of conserving game by means of the sanctuary is growing and the next few years will doubtless see many thousands of acres added to the already extensive refuges.

CALIFORNIA AND SPIKED BUCKS.

A bulletin of the United States Department of Agriculture intimates that California is the first state to protect "spiked bucks," or deer with unbranched horns, instead of deer with horns of a certain length. As has been proven by the past open season, this law can be easily enforced. Except in this instance, Cali-

fornia were not molested. This locality seems to be a hotbed for violators of the type that "keep an extra cartridge in the gun for the game warden," for it will be remembered that in the same locality last year a game warden was killed when he attempted to search a wagon loaded down with ducks.

A DISTRIBUTIONAL LIST OF THE BIRDS OF CALIFORNIA.

There has just come from the press what is without doubt the most valuable reference work on California birds published up to the present time. The title, "A Distributional List of the Birds of California," gives but an incomplete idea of the contents of the work. Introductory

chapters deal with theories and principles concerning the distribution of animal life with especial reference to conditions in California. Then follows an up-to-date summary of the manner of occurrence of the 541 species and sub-species of birds now authentically credited to the State. A supplementary "Hypothetical List" pertains to such species as have been accredited to California on insufficient grounds,

the reader might wish to verify, consisting mainly of references to literature, or to specimens existing in collections.

The index is an extremely valuable feature of the publication, including as it does, besides the currently accepted names of the species, all the synonyms under which they have been known in California ornithological literature, so that the general reader will be able to ascer-



Fig. 11. Fish and Game Commissioners Avery of Minnesota and Crampton of Connecticut with pet valley quail at State Game Farm, Hayward, California. Photograph by G. H. Graham.

with the author's reasons for doubting the authenticity of the records.

Each species is accorded the following treatment: First, the accepted name, English and scientific, followed by a complete synonymy of all the names under which the species has been known *in literature pertaining to California*. Then a statement, as concise as possible, of the exact range in California, and, in general, its status as resident, or migrant, etc., as the case may be. Authorities are given for practically every statement that

tain at once the exact status of any bird he may happen to read about, no matter under what name it be listed.

Careful research and the gathering of series of museum specimens have led to a great advance in knowledge of California birds during the past few years. The pioneer ornithologist, Dr. J. G. Cooper, was able to catalog but 353 different varieties in 1868. By 1892, 445 different species were known, 491 in 1902, and 530 in 1912; whereas this last list enumerates 541. Of the number now

known to exist within our State, 168 are water birds, 373 land birds, and 108 game birds. Members of the sparrow family are most numerous, 96 different varieties being known in California. A large number of the additions to the State list are what are known as stragglers—birds which only occasionally wander into California. Notable among some of the out-of-the-ordinary birds whose occurrence has been noted in California, are the Wilson stormy petrel (Mother Carey's chicken), the water turkey, eastern sea brant, roseate spoonbill, Tennessee warbler, and Louisiana water thrush.

The author of this distributional list is Dr. Joseph Grinnell, director of the University of California Museum of Vertebrate Zoology, one of the foremost ornithologists of the Pacific coast. He is also editor of the "Condor," the official organ of the Cooper Ornithological Club, and one of the foremost of the ornithological periodicals of the country. The "Distri-

butional List of the Birds of California" is number eleven of the series of Cooper Club publications known as the "Pacific Coast Avifauna." It can be procured only from Mr. Lee Chambers, business manager of the Cooper Ornithological Club, Eagle Rock, California, at three dollars per copy, unbound. Members of the Cooper Club are enabled to obtain the book at half price.

LECTURES ON WILD LIFE.

The Bureau of Education, Publicity and Research is in a position to furnish gratis to a limited extent, stereopticon lectures on the following subjects to organizations that make application:

1. The Game Birds of California.
2. The Game Mammals of California.
3. "Our Vanishing Wild Life."
4. A Scientific Basis for Bird Protection.
5. Methods of Game Conservation.
6. The Economic Value of Birds.

HATCHERY AND FISHERY NOTES.

CRAB FISHERIES AND THE CRAB LAW.

The crab season opened in this State on November 15 and will remain open until July 30. The rest of the year is closed in order to protect the crabs during the breeding and moulting times. Besides this closed season crabs are given additional protection by prohibiting the sale or possession of female crabs and the possession or sale of male crabs measuring less than seven inches across the back.

California has become a crab-eating state, and crabs find here a better market than in any other Western state. There are taken annually in the waters of California 60,000 dozen crabs, and we import from the North 15,000 dozen more. These crabs are brought to the wholesale markets in sacks, two dozen to the sack, and in two grades, large and medium. Large crabs average twenty-four pounds per dozen, medium crabs twenty pounds per dozen. The fishermen get from \$1.25 to \$2.25 per dozen and the consumer pays from twenty-five cents to thirty-five cents apiece. Over two hundred crab boats operate out of San Francisco and Sausa-

lito and about thirty-five in Monterey Bay, while minor fisheries are located at Fort Bragg, Eureka, and Crescent City. The value of boats and nets engaged in the fishery in this State is near \$200,000, and the crabs caught have a wholesale value of \$120,000.

Until within the last three years crabs have not been taken in Monterey Bay in sufficient quantities to be commercially important. In 1913 a few crabs were shipped from Monterey and Santa Cruz and before the salmon run took the time of the fishermen, twenty-five boats were operating and catches of as high as twenty dozen to the boat were made. The crabs were taken principally with three mesh or trammel nets set on the bottom off the sand beaches. Fishermen say that attempts to catch the crabs with the hoop-nets as used at San Francisco have not been successful. The law prohibited the use of trammel nets in the years 1911 and 1912, but during the years prior to that time when trammel nets were used the take of crabs was unimportant. On resuming the use of trammel nets in 1913 crabs were taken in paying quantities and during 1914 the catch was so good

that the opening of the season in the present year found thirty-five boats operating. Trammel nets were again forbidden in Monterey Bay by the last State Legislature, for it was found that fully 20 per cent of the fish caught in these nets, set on the bottom, were destroyed by hag fish, or "eels," as the fishermen call them, before they could be removed from the nets. Large numbers of undersized and female crabs were often caught in the pockets of the nets, and the easiest way to remove them was to kill what would not shake out. Otherwise the crabs would hang on with their pincers and it would take hours of time and much patience to remove them.

With these nets forbidden under the present law, single meshed gill nets have been employed with more or less success. Fish and Game Deputy P. H. Oyer reports that during the latter part of November the boats from Monterey each took an average of six dozen crabs a day with these nets and that the crabs are exceptionally large, measuring over seven and one-half inches across the back. The fishermen report that they see no female crabs. They think that the single meshed net catches crabs as well as the trammel and the undersized crabs are easily released. In fact, with the seven and one-half inch meshed nets which they are using they say they catch no female crabs and very few crabs that are undersized.

Fish and Game Deputy R. B. Heacock reports that the Santa Cruz crab fishermen are not having the success they anticipated. The twelve boats fishing on that side of the bay take from thirty to forty dozen crabs a day. They started fishing in fourteen to sixteen fathoms of water but have found the crabs more plentiful in deeper water, several of the boats fishing in thirty-five fathoms. They think the single mesh net is not as effective as the trammel, but, on the other hand, if a mesh no smaller than seven and one-half inches is used most of the females and undersized males escape and those that are caught can be more easily removed without injury. The paranzella trawl nets fishing in forty-five to fifty-five fathoms of water west of Santa Cruz each take about two dozen crabs a day, while fishing for "soles" and "sand-dabs."

In June, 1914, it was reported that large numbers of dead crabs were being

washed on the shore at Monterey and their destruction was laid to the trammel nets. On visiting Monterey on June 22, many of these "dead crabs" were still in evidence and were found to be the cast shells of crabs averaging six inches across the back. Fishermen of experience had taken these for dead crabs. The crab season opens on November 15, at which time the crabs have shed their old shells and the new ones have become hard and the flesh has lost its watery consistency and is again good to eat. From the following observations it appears that the moulting season may be later in northern California.

Fish and Game Deputy E. C. Boucher saw on September 30, 1915, at Crescent City, Del Norte County, more than a hundred cast shells of the edible crab which had just been washed on the beach. Most of them were very large, measuring near nine inches across the shell. A few days later he noticed fresh cast shells on the beach at the mouth of Smith River. Deputy H. S. Prescott reports that on November 20 at Crescent City, he saw a crab which had just moulted and was still in a watery condition, and adds: "The fishermen here think the season opens two weeks too early as this shedding condition is general at this time of the year."

SUMMER MIGRATION OF EDIBLE CRABS.

During the summer months there is a considerable movement of small, edible crabs into the lower ends of the rivers and creeks flowing into San Francisco Bay. These crabs, which are immature, average about four inches across the back. Their migration, which undoubtedly is the result of a search for food, is probably regulated by the advance of salt water into the lower streams caused by the lessened flow of water during the dry summer months. The crabs are strictly salt water animals and die if placed in fresh water. As the salt water moves up into the stream on a flood tide they advance and occasionally are caught by the fresh water during the ebb and to escape this they crawl out on to the mud or into the tules and it is reported they occasionally die here by the thousands. They are numerous during the summer in the Carquinez Straits and have been found as far up as Pittsburg, on the San Joaquin River.

SOFT-SHELLED CLAMS PLANTED IN MORRO BAY.

Dr. Harold Heath of Stanford University has just completed a preliminary survey of the clam and shell-fish beds of California, and the Fish and Game Commission expects to publish his report in the near future.

Under the supervision of Dr. Heath, two thousand Eastern soft-shell or mud clams (*Mya arenaria*) were on the fourth and fifth of November, 1915, set out along five different beaches in Morro Bay, San

NEW FISH CANNERY ON SAN DIEGO BAY.

The Neptune Sea Food Company of San Diego, of which Mr. F. W. Johnson is president, has just completed and started to operate a new fish cannery on San Diego Bay. Its principal business will be the canning of California sardines. It is the intention of this company to put out a very fine article in oil in quarter-pound flat cans. It will also can the larger sardines soured in one-pound oval cans. The plant is also equipped to dry



Fig. 12. Eel River Hatchery where salmon were spawned in the fall of 1915 to obtain eggs for hatching. The run of salmon on the Eel River was up to the average in the fall of 1915.

Luis Obispo County. These clams, which were introduced into several of our bays some fifty years ago, have never before been "planted" in Morro Bay. Dr. Heath reports the conditions most favorable and states that a "set" of young clams may confidently be expected in the latter part of next August.

REPORTS ON THE SALE OF FISH.

Monthly reports of the fish handled in the State are being regularly submitted to the Fish and Game Commission. They are sent in by handlers of fish in compliance with a law recently passed, and we hope with the next issue of this magazine to commence making quarterly reports of the quantity of each variety of fish, mollusk and crustacean taken in the State.

and pickle fish by means of the latest sanitary methods.

CAVIAR FROM SALMON AND SHAD EGGS.

Mr. A. Cotoff, a Russian expert in the manufacture of caviar and other fishery products, has recently arrived in San Francisco, and in company with Mr. B. Nosov, is trying to interest local fish dealers in manufacturing caviar from salmon and shad roe, which at the present time is being thrown away in enormous quantities. Mr. Cotoff was astonished to find that here fish roe and milt are little used, especially as there is an excellent local market for the roe in the form of caviar. Imported caviar is sold at from \$2.50 to \$2.75 a pound, and he says he can manufacture a superior article here at

a cost of thirty cents per pound. If some good use can be made of the roe and milt as food, what is now a waste product will be utilized, for half a million pounds of salmon roe alone are thrown away each year in the State.

FISHERIES OF LOWER CALIFORNIA UNPROTECTED.

It is reported that representatives from the Pacific Coast will ask our government to seek the purchase of Lower California from Mexico. Lower California, besides the harbor of Magdalena Bay, possesses valuable fishery resources. Many of the sea fishes taken in California waters spend their spawning season off Lower California. In fact, that is their principal residence and they follow their food into California waters during the summer time. To properly conserve these fish, the most important of which is the long-finned tuna, it will be necessary to protect the young and the spawning fish in Lower California waters. The value of the long-finned tuna pack in California exceeds \$1,500,000 a year and the stability of this great industry will depend on the protection the fish get in Lower California. This protection could best be given if the United States government had control, for Mexico has not protected her west coast fisheries in the past and is not likely to do so for some time in the future.

THE HUMPBAC AND DOG SALMON TAKEN IN SAN LORENZO RIVER.

During November of this year Deputy H. B. Heacock took several humpback salmon (*Onchorhynchus gorbusha*) and three dog salmon (*O. keta*) in the San Lorenzo River, Santa Cruz County. This is not the first time the humpback has been recorded from this stream. It appears here only occasionally, however, and is far out of its natural range. Stray individuals have been taken in the Sacramento also, but as far as is known the San Lorenzo is the most southerly point from which it has been recorded. The humpback salmon reaches a weight of from three to six pounds and matures at two years. The spawning males are thin and compressed and have a decided hump just back of the head. The color of the fish is bluish above with numerous round black spots, which on the tail are large

and oblong in form. The scales are smaller than in any other salmon, there being over two hundred transverse rows along the side of the body.

The dog salmon has been reported from the Sacramento River also, but never before from a point as far south as the San Lorenzo River. As a result four out of the five species of salmon have been taken in the latter stream: the quinnat, silver, humpback and dog. The remaining species, the blue-back or sockeye, does not appear in California except as stray individuals are occasionally taken in our northern streams. Mr. G. R. Field reports that about twenty sockeye salmon were taken in the nets on the Klamath River this summer. He also records the capture of a striped bass just outside of the mouth of Klamath River about August 1, 1914. The fish was six or seven pounds in weight.—N. B. SCOFIELD.

THE FALL RUN OF SALMON.

The fall run of salmon on the Sacramento River has been a very light one this year. The take of salmon eggs at the spawn-taking stations, which may be taken as an index of the size of the run, was no more than half the usual amount.

The runs on Eel, Klamath, and Smith rivers, however, have been good and up to the average. On Eel River two species of salmon are taken, the quinnat (known in the North as king and chinook) and the silver salmon. The netting season now opens on this stream on October 7, a much better arrangement, for the fish caught on the opening day were in excellent condition this year, which was far from the case in previous years, when the season opened later. The netting season now closes on December 7, which may be a little late to give the best protection to the two species of salmon and to the steelhead, which begins running in increased numbers late in November, but it is far better than the old law which allowed netting until the end of January. Large numbers of the two species of salmon on Eel River are shipped fresh to San Francisco. A few are salted and mild cured. Salmon have not been canned on this stream for several years.

On Klamath River two species, the quinnat and silver, are taken, and practically all are canned, very few being shipped fresh.

On Smith River also both quinnat and silver salmon are found. Here the fish are canned, none being salted or shipped fresh.

Quinnat salmon are caught in commercial quantities in Monterey Bay in June, July and August. They are caught entirely by trolling (see Fig. 13). The catch this past summer exceeded two and a half million pounds, slightly exceeding the catch of last year, which was the largest catch ever made in the bay up to that time.

DO HOOKED FISH DIE AFTER BEING RETURNED TO STREAM?

There has been considerable discussion as to whether undersized trout taken with

66 per cent of the undersized fish taken with baited hook, returned to the stream by the angler, die.—W. T. CLARKE.

FLY-CAUGHT FISH NOT INJURED.

The statement has been so often made that it is useless to return a hooked fish to the water because it will die anyway, that most anglers have come to accept it as an axiom; yet the idea is erroneous. When the anglers of California shall have learned that it is not necessary to take the life of a young fish merely because it becomes impaled upon a fly-hook, thousands of immature fish will annually be returned to the water to grow up sizeable fish ere they find their way into the baskets of the angling



Fig. 13. Salmon boat on Monterey Bay with outriggers for trolling. Photograph by N. B. Scofield.

baited hook live after being returned to the stream. On the supposition that a large percentage of them die, the law was changed a few years ago so that there is now no size limit. In order to test out exactly what the death rate on the hooked fish really is, one hundred undersized steelhead trout were carefully taken from the hook and placed in a box alongside of the Noyo River, Mendocino County, through which a good running stream passed. In reality the fish were simply held in a portion of the river by means of screens. Of the one hundred fish experimented upon, sixty-six died within ten hours after being hooked. Judging from this experiment, therefore, about

fraternity. For, anglers as a class are not wantonly destructive; and it is wanton destruction to knowingly take twenty fish from a stream in order to secure as much fish in pounds weight as one fish out of the twenty would amount to if permitted to remain in the stream for another season or two.

The best answer to the statement that hooked fish will die when returned to the water is to point to the fact that most of the waters of a vast section of the Sierra Nevada Mountains have been stocked with fish which were taken with hook and line. In all the hundreds of plants which we have made in the barren waters of the San Joaquin, Kings,

Kaweah and Kern River watersheds with fish taken from their native habitat by means of a fly, there is no record of a failure to successfully establish the fish in the new waters. Nor can doubt be cast on this kind of evidence by suggesting that for all our success, the percentage of fish which actually survive being hooked, might have been very small; for the reason that all the evidence points to the conclusion that the percentage of losses among hooked fish must have been a negligible quantity. For instance, I recall one stream, Kaiser Creek, in the San Joaquin watershed, which was stocked with only three fish taken from the main San Joaquin River. A plant of three fish does not allow for a considerable percentage of loss if the stream is to become stocked. In many other instances where we have planted but a few fish in comparatively insignificant streams, such streams were always found a few years later to be well stocked with fish.

Again, in the office of the Fresno division of the Fish and Game Commission, we have the record of many long carries of adult fish, which were taken with hook and line, to be transplanted in far distant barren waters. Repeatedly we have taken and held such fish in the cans for periods of from seven to fourteen days. Overlooking the hazard which always accompanies holding large numbers of fish in a can and taking no account of the trying experience of being carried in such cans on the backs of pack mules over the roughest of the Sierra Nevada Mountains for many succeeding days, the percentage of losses from all causes among such fish is very small indeed. There is no more delicate fish to successfully carry than the golden trout, yet in his official report, now before me, I find that Deputy S. L. N. Ellis, of the Fresno division, in September, 1913, carried 821 golden trout from Whitney Meadows to the Roaring River watershed. The actual carry was six days successive travel and the total time which the first of the hooked fish had been in the cans until they were finally liberated, was fourteen days. The fish, according to Deputy Ellis's report, were planted in good condition with a loss of only five fish.

In 1914 the Fish and Game Commission, through deputies of this Fresno division, took with hook and line, from Volcano Creek at Whitney Meadows, over 5,000 golden trout, which were used in stocking barren waters along the Sierra summit, and most of these fish were carried on pack mules for periods of from four to fourteen days. Commissioner Mr. Carl Westerfeld was present during many of these operations and will, I am sure, bear witness to the fact that the losses among such hooked fish were practically nil. Out of one lot of 1,080 golden trout, all taken with hook and line, and held in cans from seven to ten days, of which most of the time they were en route via pack train to their destination in new waters, there was a total loss, from all sources, of just three fish. These are but typical instances. In eighteen years of experience while planting hundreds of barren waters with thousands of fish taken with hook and line, I have found that with reasonable precaution, at least 95 per cent of all trout taken with a fly are not fatally injured.

Conceding that much of the success in preserving the lives of these hooked fish was due to skillful handling, the proof is, nevertheless, that it is not necessarily fatal to a fish to become impaled upon a barbed hook. I am quite willing to concede that a hooked fish can be fatally injured by rough or careless handling; and I know that if a trout is hooked deeply in the throat or gullet it will probably die, but to avoid killing the greater percentage of hooked fish is an easy matter; nor does it require an unusual amount of skill, time or patience. In taking up fish for transplanting we naturally try to take as many fish as possible in a short time; hence we can not devote much special care to saving each fish. The man who fishes for pleasure can easily duplicate our methods in avoiding injury to the fish.

In the first place, of course, we take our fish for transplanting entirely with "flies." By using a No. 8 or even a No. 10 hook, the small fish do not readily swallow the hook and thus when impaled, they are hooked in the cartilage about the mouth. Taking hold of the fish with a wet hand in order to avoid breaking

down the scales, we gently disengage the hook and the fish is then as free from injury as though it had never taken the lure. While it is undoubtedly the chief thrill of the angler to take a large fish on a small fly, at the same time Midget flies will hook more small fish deeply than larger flies. Some day anglers may make it a rule to use small flies when fishing in waters where big fish predominate, and No. 8 flies in streams where the fingerlings greatly outnumber the sizable fish. Again, the destruction of immature fish by the use of very small bait hooks must be great. Even this difficulty could probably be avoided (if people *must* fish with bait hooks) by using

larger hooks. The point is that, unless hooked deeply in the throat or gullet, practically no fish need be killed by reason of having been taken with hook and line, provided reasonable care is used in taking the fish from the hook and in returning it to the water. If a trout is deeply hooked to the extent that much blood is drawn when taking it from the hook, such fish may just as well be put in the basket and become one of the day's catch; but all the while it should be borne in mind that with reasonable care the percentage of such small fish which must necessarily be creeled, is comparatively infinitesimal.—A. D. FERGUSON.

CONSERVATION IN OTHER STATES.

BULL FROGS INTRODUCED INTO OREGON.

In the last number of THE OREGON SPORTSMAN a writer states that the edible bull frog, originally imported from France and established near Boise, Idaho, has been introduced into Oregon. Thirty dozen tadpoles and about six dozen adult frogs secured in Idaho, have been placed in the ponds and sloughs of Baker and Grant counties. It is said that frog hunting is considered great sport in parts of Idaho. The frogs are taken by using a .22 calibre rifle or by lowering over their heads a hook baited with red flannel. As great caution must be used in approaching the big ones as is used in angling for an old and wary trout. The introduction of the edible frog has been made in order that recreation and food may be had in localities where game does not abound.

A CONNECTICUT POSTER.

Connecticut is attempting to educate her citizens regarding wild life by displaying throughout the state placards bearing the following information:

The very startling statements made by the Hon. Wm. C. Redfield, Secretary of Commerce, in his address before the National Fish and Game Commission held in Washington in September last, prompts the Commission to make this vigorous appeal to you. Secretary Redfield stated that insects cause an annual loss of

two and one-half billion dollars to the agricultural interests of the United States.

Forty years ago, the preservation of wild life was regarded chiefly as a sentimental cause, of practical interest to the sportsman only. Today, that cause is not only acutely sentimental, but it has also been intensely practical to millions of American producers and consumers. It affects the lumber pile and the market basket, and it is of such practical importance that it demands the attention of the public at large.

COUNTIES MAY CLOSE SEASONS ON GAME IN PENNSYLVANIA.

Local protection is given game in Pennsylvania by a law which gives the board of fish and game commissioners of the commonwealth power to close, for a term of years, all hunting of elk, deer, squirrels, wild turkey, ruffed grouse, quail, ring-necked pheasants and Hungarian partridge, or either of them, as it may appear necessary to the citizens of any county. Whenever at least two hundred citizens of a county, through written petition, certify to the board of game commissioners that, in their opinion, an absolutely closed season is necessary to insure the better protection and subsequent increase of such game and shall have furnished the commissioners with proper information relative to the status of game and shall have published for at

least three consecutive weeks in two or more prominent newspapers a statement that such a petition has been filed, the commissioners are empowered and directed to declare a closed season not to exceed five years. Although this law is not yet a year old, many counties in Pennsylvania have taken advantage of it to close the season on deer and elk and in some cases on ruffed grouse and quail.

SHARP-TAILED GROUSE IN OREGON.

In that the sharp-tailed grouse was formerly numerous in northeastern California but is now extinct, the following good news from Oregon is particularly interesting. Had California taken better care of her game resources this species would still be a member of her fauna.

"Mr. E. F. Averill, of Pendleton, Oregon, reports that in 1912 there was a small 'band' of Columbian sharp-tailed grouse or prairie chickens on the farm belonging to J. M. Tabor, Hermiston, Oregon. These birds have been carefully protected by Mr. Tabor, and last winter Mr. Averill counted over 150 birds in the flock. He thinks it has increased to at least 200. This bird has been very rapidly disappearing in Oregon, and this seems to be one of the few places where they are not only holding their own, but increasing."—*The Oregon Sportsman*, October, 1915.

PROTECTION REMOVED FROM BUZZARDS AND CORMORANTS.

Legislation relating to game in 1915 showed a tendency to remove protection from the turkey buzzard and cormorants. The former is accused of carrying diseases of cattle and hogs, and the latter are doomed to destruction because of their voracious appetites for fish. Delaware, Florida, and North Carolina removed protection from the turkey buzzard and Illinois and North Dakota from cormorants.

STATE LAWS HARMONIZED WITH FEDERAL REGULATIONS.

A recent government report states that a number of bills have been introduced in various state legislatures for the purpose

of harmonizing the state laws on migratory birds with the federal regulations. In at least nine states changes have been made which bring the seasons into substantial agreement, viz: California, Connecticut, Maine, Michigan, New Hampshire, Tennessee, and West Virginia; in Illinois the seasons for all migratory birds except coot and waterfowl, and in Washington for the smaller shore birds. Uniformity was also secured by provisions in the laws of Connecticut, Maine, New Mexico, North Dakota, Washington, and Wisconsin, prohibiting hunting between sunset and sunrise. On the other hand, Delaware adopted a resolution opposing the migratory bird law, and Ohio and Rhode Island, which had harmonized their seasons in 1914, changed the laws on waterfowl this year.

THE "OREGON SPORTSMAN" IN NEW FORM.

With the October issue *THE OREGON SPORTSMAN* changed from a monthly to a quarterly publication. In its new form it contains more than three times as much reading matter. As in the past, it will treat of all the phases of game protection and propagation and will emphasize the importance of making fishing and hunting a valuable resource of the state. Under the editorship of three men, C. D. Shoemaker, state game warden, W. L. Finley, state biologist, and G. P. Putnam, secretary of the Oregon Fish and Game Commission, it becomes more distinctly a state publication. The subscription price, fifty cents a year, remains the same.

BISON HERD INCREASED.

Recent reports state that ten calves have been added to the government's herd of buffalo on the Wichita National Forest in Oklahoma, which is also a federal game preserve. Eight of the calves are females, and bring the number of heifers and cows up to thirty. The bulls number thirty-two and have been placed in a separate pasture. The herd now comprises sixty-two specimens in all, and is in good condition.

LIFE HISTORY NOTES.

GREEN-WINGED TEAL NESTING IN
ALAMEDA COUNTY.

It has been conceded generally that the green-winged teal (*Nettion carolinense*) does not nest commonly in the State of California. Definite records of nesting are limited to Ventura County, Tulare Lake, and Sierra Valley, Plumas County. It was of interest, therefore, to find this teal breeding in numbers in the marshes near Alvarado, Alameda County. On June 22, 1915, a female green-winged teal and four young almost as big as herself were seen here on a pond, and one of the young was captured. On June 26, in marshes north of Alvarado, five green-winged teal, part of them young birds, were seen. On the 29th of the same month a young green-winged teal about two weeks old was captured, and the following day three downy young, but three or four days old, were obtained. The mother accompanied these ducklings and was approached within a distance of fifteen feet, so that identification was sure. Again, on July 9, I came upon a female green-wing with twelve young about her, apparently about a month old. One of these birds was secured also. The last young green-wings were seen on July 14, when five adults were flushed and three young birds were captured.

Of the young green-winged teal captured, a number have grown to maturity and are now in full plumage, so that there is no doubt but that identification was correct. These birds may be seen on the pond at the State Game Farm at Hayward. Several sets of eggs taken in the same locality in May were hatched out, and the downy young appeared to be green-winged rather than cinnamon teal. Hence, it seems that the green-winged teal, as well as the cinnamon teal, is a common breeder in the Alameda County marshes.—W. N. DIRKS.

THE OPOSSUM IN LOS ANGELES
COUNTY.

In February, 1915, an adult female opossum (*Didelphis virginiana*) was brought to me at Whittier, Los Angeles County, having been caught in a trap in the flats about the San Gabriel River, a mile and a half from town. She was found to have ten young in her pouch.

From their size and immaturity, I should judge they were less than a week old.

The finding of this animal led to reports of many others having been caught in the vicinity. As usual, many of these reports, when traced to their source, proved to be only hearsay, with nothing definite back of them. Several, however, proved more reliable. Of these, the first record was in 1906 by a road overseer, who ran over an opossum within about a mile from where the one brought to me was found. He said two others were taken the next day near the same place. According to his report there "seemed to be lots of them in the river bottoms, just like the ones we used to get back in Missouri and Arkansas; only these were not so big. They seemed to be a smaller kind."

The next record was in February, 1912. An old opossum was taken in a chicken yard some little distance from the river. Another has since been reported from the same place, taken in October, 1915.

In June, 1913, an old female opossum with several young, unborn, was taken near the place of the first record. This one was mounted and is in the possession of a taxidermist of this vicinity.

While the above are the only authentic records, still there seems to be a general impression that opossums have been taken occasionally for the last five years, although several Mexicans and ranchers living near the river were entirely ignorant of the presence of these animals in the locality.

The one brought to me was kept for several months in a cage. She was fed a variety of substances, but seemed to prefer fresh liver to any other food. Although it is said opossums will eat carrion, this one would not touch it. Occasionally she would eat vegetables, such as lettuce and tomatoes. She preferred fruit to vegetables, but would leave even this untouched if fresh meat were given her.

During all the time of her captivity, from February till September, neither she nor the little ones showed any signs of domestication. The young ones continued to snap and even jump at any one putting his hand in the cage; the old one, according to my observation, did not at

any time snap at any one, although she would open her mouth at the slightest disturbance. The young developed this trait of opening the mouth as soon as they left the pouch, and exercised it upon every occasion possible.

When the mother was brought in, one of the young was taken from the pouch with great difficulty. It was clinging to the mammary gland so tightly that enough force to all but pull the little one in two was needed before it could be dislodged. The young all appeared to have clinched their jaws so that they could not loosen, for it was several weeks before any of them were observed to be free from their mother. They then began to crawl about within the pouch and eventually to venture outside it. The one taken from the pouch, and preserved, is very undeveloped. Although there was a small lobe for the ear, there was no opening connecting with the interior, and the eyes were still closed. Apparently no distinct lids had been formed. It was over a week before such openings could be detected. The legs also were very small and undeveloped compared to the rest of the body, as is seen in all embryos.

Although a large cage was made for the opossums and a small tree was put inside it, they were never seen to climb and their legs became bent and gnarled from lack of use. This might have been partly due to the fact that the mother was crippled and did not move about freely.

The hot weather in August apparently was too much for them. First the mother died and then one by one the little ones.—
ETTA V. LITTLE.

CANADA GEESE SUCCESSFULLY BRED IN CALIFORNIA.

The statement that Canada geese (*Branta canadensis canadensis*) had not been bred successfully in California, which appeared in a recent number of CALIFORNIA FISH AND GAME, has elicited the following communication from Mr. George Neale of Sacramento: "Mr. Henry Schook of Yreka, Siskiyou County, California, for many years raised a large number of Canada geese. Some years ago I saw a number of young and old birds of this species at his place and

Mr. Schook also showed me the nesting places in some old barrels in his yard. On the other hand, Mr. A. W. Stuart of Grand Island, Sacramento County, has kept eighty wild geese of all the varieties common to California for many years. These geese, however, have never laid an egg. It seems, therefore, that in all probability Canada geese can be successfully reared only at elevations of over 2,000 or 2,500 feet.

A letter from Mr. Schook of Yreka states: "I tipped the wings of two honker geese, and then took them home and doctored them up. It just happened that they were a pair. In the spring the female began laying and reared six young. The next season the old birds raised twelve more and a pair of those raised the previous year raised five. At one time I had thirty-eight birds. Children and strange dogs have killed them all so that I have none at the present time. A friend of mine to whom I gave one that I had raised, still has it. It must be very nearly twelve years old."—H. C. BRYANT.

VALLEY QUAIL SUCCESSFULLY PROPAGATED.

About June 15, 1915, I discovered that the one pair of valley quail I had in captivity was nesting. The nest on that date contained eight eggs. The number soon grew so that I could not count them without disturbing the birds. I did not go near them till I thought it about time for the female to be sitting, but she showed no signs of doing so. About the first week of July, fearing she would not sit, I took twelve of the eggs and gave them to a bantam hen; she sat and hatched nine and raised seven of them. Shortly afterwards I took the remainder of the eggs, fourteen in number, and gave them to another bantam; she hatched eight, but trampled four of them, and one got away, so only three remained.

Later I discovered the quail was still laying. Twenty eggs were, therefore, taken and given to a third bantam, but only two of the twenty were fertile. These hatched and were successfully reared. Later I found four more eggs, making fifty eggs for the season.

A few days before the quail were due to hatch I put some meat scraps aside to raise maggots, which I fed to the quail

after they were twenty-four hours old. I also fed them chick feed and chopped cabbage. They thrived on this feed and I do not think I lost one from sickness.

As they hatched I put them in a box about three by four feet with sand and dust in the bottom and wire over it, and at about six weeks, I moved them to a larger pen made of one inch wire. By this time they left the hen, to her discomfort, and roosted in the bushes.—L. A. WARD.

FALL ARRIVAL OF THE WILSON SNIPE.

The first Wilson snipe (*Gallinago delicata*) which I noted this fall were seen on Winters Island, Contra Costa County, September 27, 1915. On this date about eighteen birds were seen. On October 3, snipe were again seen, but in fewer numbers.—H. E. FOSTER.

MALFORMED ANTLERS.

It is a well known fact that the antlers of a deer are connected with the sexual organs in such a way that any change or injury to these organs is quickly reflected in the horns. The accompanying photograph (Fig. 14) shows the malformed antlers in the velvet of a black-tailed buck (*Odocoileus columbianus columbianus*) which showed injury of this kind, taken in the Alameda County hills. This is the fourth malformed deer head I have handled in the last three years, all killed in California within a six-mile radius. If the velvet were rubbed off there would be two hundred and two perfect little points from one-half to one and one-half inches long. The main tines measure fifteen inches in length and fork about half way up. The velvety condition almost gives the antlers the appearance of a sponge.—F. D. HOYT.



Fig. 14. Malformed antlers of black-tailed buck deer taken in Alameda County, California. Photograph by F. D. Hoyt.

WILD LIFE IN RELATION TO AGRICULTURE.

ARTIFICIAL VS. NATURAL METHODS OF INSECT CONTROL.

Mr. E. G. Dudley makes the statement in the *SIERRA RANGER* (May, 1915) that there are two ways in which the forest may be protected from bark beetles: "One is to burn the host trees when they are found harboring the broods, and the other is to raise and liberate woodpeckers to feed upon the larvæ. Under the present system of burning the host trees, the woodpeckers are becoming reduced in numbers, owing to the cutting off of their food supply." An interesting problem is here presented and one which should be thoroughly studied. The tendency up to the present has been to make use of the artificial methods of control. Optimism as to the results of such methods is rife. Meanwhile some of our best bird friends are left to starve to death. The solution of the problem is difficult, but not impossible.

THE RING-NECKED PHEASANT AS AN INSECT DESTROYER.

A recent report of the Massachusetts Commissioners of Fisheries and Game (House, No. 2049, January, 1913) defends the ring-necked pheasant as a valuable insect destroyer. Stomach examination of wild birds taken in March showed that they had been feeding to a considerable extent on certain weeds and grain, but that in addition they were taking such pests of the garden as tomato worms, wireworms, cutworms, potato bugs; such fruit pests as plant lice, codling moth, tent caterpillars, and tussock moths; and such other pests as mosquitoes, house flies, gypsy and brown-tailed moths, and elm-leaf beetles.

Mr. W. L. Finley, state biologist of Oregon, is quoted as follows: "Examination of a number of Chinese pheasants' stomachs show that they eat a considerable amount of wheat, oats, peas and corn, but this damage is far overbalanced by the amount of noxious weed seeds, especially the Scotch thistle, which they destroy. They also destroy large numbers of injurious insects, such as crickets, grasshoppers, snails and cutworms. A female pheasant, killed November 1, had thirty-four grasshoppers, three crickets, and eight beetles in its crop, besides 250

noxious weed seeds. Another crop taken in November contained 303 cutworms and sixty blue-fly larvæ."

DUCKS VS. RICE.

Newspapers delight in exaggerating greatly the damage done by ducks in the rice fields of the Sacramento Valley. Many reports have recently appeared stating that thousands of dollars have been lost through the depredations of these birds. The injury actually done, however, is almost negligible, as is evidenced by the following quotation from a letter received from W. K. Brown, manager of the Moulton Irrigated Lands Company: "While this year's harvest is our fifth crop of rice, I have never been able to discover any material damage that the ducks have done. In my opinion the rice which the ducks eat is that which has already been knocked out of the head by the blackbird."

Mr. M. L. Carr of Colusa also writes: "This is to certify that the report recently made that I had lost 100 acres of rice by the wild ducks this year is absolutely false. The ducks did me no damage whatever."

Deputy S. J. Carpenter made a personal investigation on the Blevine and Mallon tract and found that the ducks were not damaging growing grain. The grain that the ducks were feeding upon was the waste caused by cutting or threshing or that which had been knocked out of the heads by blackbirds.

It is true that the gullets of many ducks killed this season have been filled with rice, but this was evidently gleaned from the ground and not from the heads.

Wild ducks feed in the very same way on the rice fields as the geese do on the stubblefields; they are gleaners. The mowers and binders knock out a quantity of grain while cutting, and this consequently remains on the ground. And it is this grain that we find in the gullets of ducks and geese. People who do not understand the situation infer that because a mallard has a throat full of rice he has been lighting on the growing grain and destroying it. This is obviously ridiculous. And beside, as a matter of fact, ducks do not relish growing rice. It is too tough. Blackbirds do the most

damage to rice crops, for they pick the grain from the stalks before it is ripe and thresh large quantities out with their wings while feeding.—GEORGE NEALE.

BLACK BASS EAT MOSQUITOES.

Reading the very interesting article in the October number of CALIFORNIA FISH AND GAME by Mr. N. B. Scofield, in charge of the Department of Commercial Fisheries, regarding mosquito control by the use of the stickle-back fish in the bay region, brought to my mind that before the introduction of the black bass into the Sacramento and San Joaquin valleys the problem of mosquito extermination was one of the most vexed with which the health authorities had to deal. A large number of small lakes and ponds north and west of Sacramento City, caused by winter overflows, were the breeding places of myriads of these pests. Crowds of disease carriers would blow into the city, making it almost impossible for any one to rest night or day. However, a few years after the introduction of the black bass a noticeable decrease in the number of mosquitoes was apparent, until today it is an unusual occurrence to find them in this locality. Reclamation is no doubt responsible in some degree for the near extermination, but I attribute the almost entire absence of mosquitoes at this time to the presence of black bass in the overflowed waters. From my own observation I know that the young black bass, from feeding stage to a year old, feed on the larvæ of the

mosquito. I have found the stomachs of the young bass gorged with the larvæ of the mosquito. I once placed over twenty small bass in a barrel of stagnant water alive with mosquito larvæ. In a day or two there was no sign whatever of any larvæ remaining.

Mr. Scofield notes that what adds to the difficulty of exterminating the malarial mosquito is the presence of rice fields in some of our worst malarial districts. Now, the waters adjacent to the rice fields, sloughs, creeks, and rivers, are literally alive with black bass. Every ditch contains them in some quantity. The fish come in from the large overflows below the rice fields and not from the intake above, as many people believe. As the water recedes the bass back into the drainage waters or overflows which comprise the duck shooting grounds of Sutter and Butte counties, or, at least, as many as can possibly back out without becoming stranded. Many black bass are reported to be lost in these places. If they have served their purpose of destroying the mosquito larvæ it is no loss, to my mind, to lose a few of the bass.

I have learned from some of the oldest residents in the Butte Creek section that many years ago, before the introduction of the black bass, it was almost impossible to live, owing to the enormous number of mosquitoes. So bad were they at times that stock were sometimes worried to death or drowned in seeking refuge from them in the water.—GEORGE NEALE.

COMPARISON OF LEADING FISH AND GAME COMMISSIONS OF THE UNITED STATES.

| State | Area in square miles | Commission | Year | Number salaried employees | Average warden salary | Number game birds distributed | Number fish distributed | Arrests | Convictions | Licensed hunters | Licensed fishermen | Expenditures |
|---------------|----------------------|---|----------------|---------------------------|-----------------------|-------------------------------|-------------------------|---------|-------------|------------------|--------------------------------|--------------|
| California | 155,980 | State Fish and Game Commission. | 1914 | 117 | \$105 00 | Saved for breeding, 1914 | 39,238,001 | 881 | 744 | 159,264 | 3,921 market 81,905 anglers | \$255,847 75 |
| Oregon | 96,030 | State Fish and Game Commission. | 1914 | 85 | \$90 00 | 3,045 | 38,151,667 | 333 | 307 | 55,320 | 59,899 | ----- |
| Maine | 29,895 | Commissioners of Inland Fisheries and Game. | 1914 | 75-125 | \$82 50 | ----- | 4,407,950 | 289 | 270 | 1,753 | ----- | \$108,909 87 |
| Vermont | 9,135 | Department of Fisheries and Game. | Fiscal 1913-14 | ----- | \$85 00 | ----- | 2,000,000 | ----- | 124 | 30,000 | ----- | \$10,751 21 |
| New Hampshire | 9,005 | State Fish and Game Commission. | 1914 | 10 | \$100 00 | ----- | 7,000,000 | 125 | 103 | 28,000 | ----- | \$22,000 00 |
| Ohio | 40,760 | Agricultural Commission —Fish and Game Division. | 1914 | 40 | \$65 00 | 12,000 | 300,000 *300,000,000 | 400 | 330 | 130,000 | Commercial 15,000 | \$120,000 00 |
| New York | 47,620 | Conservation Commission | 1914 | 415 | \$900 00 | Eggs 31,541 3,004 | *556,543,016 | ----- | 2,605 | 201,022 | Nets only 1,128 | \$377,334 00 |
| Michigan | 58,915 | Public Domain Commission. | 1914 | 61 | \$83 50 | ----- | 60,617,635 | 1,416 | 1,301 | 46,010 | 19,992 | \$122,436 15 |
| Wisconsin | 54,450 | Fish and Game Warden. | 1914 | 75-85 | \$83 00 | ----- | *247,079,876 | 992 | 732 | 172,753 | Non-resident 20,527 | \$152,012 82 |
| Illinois | 56,050 | Game & Fish Commission | 1913-14 | 95 | \$100 00 | 16,000 | 6,216,682 | ----- | ----- | 193,297 | 1,177 | \$153,909 53 |
| Massachusetts | 8,040 | State Fish and Game Commission. | 1914 | 75 | \$80 00 | 4,250 | 27,957,150 | 483 | 469 | 68,000 | ----- | \$135,759 29 |

*Includes a large proportion of pike, perch, white-fish and other almost microscopic eggs which are handled by the hundred million, where salmon and trout eggs are handled by the thousand.

¹Per month. ²Per day. ³Per annum.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

September 1 to November 30, 1915.

| Offense | Number of arrests | Fines imposed |
|---|-------------------|---------------|
| <i>Game.</i> | | |
| Hunting without a license..... | 61 | \$830 00 |
| Deer, close season, killing or possession and sale..... | 11 | 235 00 |
| Female deer, spotted fawns, spiked bucks, killing or possession | 21 | 750 00 |
| Illegal deer hides and failure to exhibit skin and portion of head bearing horns..... | 4 | 225 00 |
| Ducks, close season, killing or possession, excess bag limit.. | 10 | 190 00 |
| Quail, close season, killing or possession, excess bag limit.. | 24 | 600 00 |
| Wild pheasant, killing..... | 1 | 25 00 |
| Rabbits, close season, killing or possession..... | 5 | 110 00 |
| Squirrels, close season, killing or possession..... | 1 | ----- |
| Wild geese, close season, killing or possession..... | 1 | 25 00 |
| Wild pigeon, close season, killing or possession..... | 1 | ----- |
| Shore birds, close season, killing or possession..... | 16 | 425 00 |
| Non-game birds, close season, killing or possession, shipping | 10 | 180 00 |
| Sea otter, possession..... | 1 | ----- |
| Hunting game (quail) inside refuge..... | 1 | ----- |
| Shooting at wild ducks from power boat in motion..... | 2 | 35 00 |
| Total game violations..... | 170 | \$3,630 00 |
| <i>Fish.</i> | | |
| Angling without a license..... | 15 | \$300 00 |
| Fishing for profit without license..... | 31 | 460 00 |
| Dealing in fish without wholesale dealers' license..... | 1 | 20 00 |
| Underweight striped bass, taking or possession..... | 5 | 65 00 |
| Undersized black bass, taking or possession..... | 1 | ----- |
| Salmon, close season, Fish and Game District No. 15, taking or possession | 2 | ----- |
| Trout, excess bag limit..... | 1 | 25 00 |
| Underweight sturgeon in possession..... | 4 | 80 00 |
| Abalones, undersized, taking or possession..... | 2 | 40 00 |
| Lobsters, under and over sized, close season, possession and sale | 4 | 140 00 |
| Crabs, close season, possession..... | 1 | ----- |
| Dried shrimp, possession, buying and selling; Chinese shrimp nets | 9 | 70 00 |
| Clams, undersized | 1 | 5 00 |
| Illegal nets | 27 | 660 00 |
| Fishing within 50 feet of fishway..... | 1 | ----- |
| Dynamiting fish | 2 | ----- |
| Allowing crude oil to pass into the bay..... | 1 | ----- |
| Total fish violations..... | 108 | \$1,865 00 |
| Grand total fish and game violations..... | 278 | \$5,495 00 |

SEIZURES—FISH, GAME, AND ILLEGALLY USED FISHING APPARATUS.

September 1 to November 30, 1915.

Fish.

| | |
|-----------------------------|------------|
| Striped bass | 440 pounds |
| Salmon | 574 pounds |
| Trout | 59 pounds |
| Miscellaneous fish | 11 pounds |
| Dried fish | 50 pounds |
| Clams | 50 pounds |
| Crabs | 1,266 |
| Shrimp | 894 pounds |
| Abalones | 4 |
| Lobsters | 114 |
| Illegal nets and traps..... | 12 |

Game.

| | |
|--------------------------|------------|
| Deer meat | 550 pounds |
| Hides | 5 |
| Quail | 52 |
| Ducks | 2,118 |
| Geese | 953 |
| Cottontails | 36 |
| Doves | 27 |
| Shore birds | 55 |
| Non-game birds | 42 |
| Miscellaneous game | 24 |

Searches.

| | |
|----------------------------|----|
| Illegal fish and game..... | 40 |
|----------------------------|----|

FINANCIAL REPORT.

Statement of Expenditures for the Months of August and September, 1915.

| | August | September |
|---|-------------|-------------|
| General administration, salaries, traveling expenses, rentals, supplies, etc. | \$1,703 03 | \$1,781 39 |
| San Francisco District, salaries, traveling expenses, rentals, supplies, etc. | 5,001 61 | 5,546 93 |
| Sacramento District, salaries, traveling expenses, rentals, supplies, etc. | 4,008 70 | 4,011 32 |
| Los Angeles District, salaries, traveling expenses, rentals, supplies, etc. | 1,931 32 | 1,738 79 |
| Fresno District, salaries, traveling expenses, rentals, supplies, etc. | 1,709 64 | 1,716 07 |
| Hatchery administration, salaries, traveling expenses, supplies, etc. | 451 08 | 581 44 |
| Fishery research and publicity, salaries, traveling expenses, supplies, etc. | 426 20 | 469 21 |
| Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc. | 486 42 | 435 46 |
| Fish transplanting, salaries, traveling expenses, supplies, etc. | 419 26 | 561 50 |
| Fish distribution cars (1 and 2), salaries, traveling expenses, rentals, supplies, etc. | 2,883 50 | 1,319 60 |
| Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc. | 322 19 | 338 13 |
| Sisson Hatchery, salaries, traveling expenses, supplies, etc. | 3,127 42 | 2,160 03 |
| Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc. | 358 31 | 310 79 |
| Tahoe hatcheries, salaries, traveling expenses, supplies, etc. | | |
| Price Creek Hatchery, salaries, traveling expenses, supplies, etc. | 108 74 | 6 50 |
| Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc. | 140 26 | 30 00 |
| Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc. | | |
| Bear Valley Hatchery, salaries, traveling expenses, supplies, etc. | 527 53 | 491 54 |
| Game Farm, salaries, traveling expenses, rentals, supplies, etc. | 282 83 | 346 76 |
| Game research and publicity, salaries, traveling expenses, supplies, etc. | 251 30 | 57 15 |
| Prosecutions and allowances | 529 90 | 3,100 80 |
| Hunting license commissions and refunds | 97 10 | 764 70 |
| Anglers' license commissions and refunds | 60 00 | 29 50 |
| Market fishing license commissions and refunds | 200 00 | 200 00 |
| Crawfish and abalone inspection | 260 00 | 380 00 |
| Mountain lion bounties | | |
| Printing and lithographing | | |
| Totals | \$25,286 34 | \$26,383 61 |

Balances September and October, 1915.

| | September | | October | |
|---|-------------|--------------|-------------|-------------|
| Support and Maintenance of Hatcheries Fund— | | | | |
| In state treasury----- | \$22,687 88 | | \$27,947 88 | |
| In bank ----- | 5,200 00 | | 2,390 00 | |
| | | \$27,887 88 | | \$30,337 88 |
| Fish and Game Preservation Fund— | | | | |
| In state treasury----- | \$68,264 56 | | \$55,195 83 | |
| In bank ----- | 4,885 00 | | 2,260 00 | |
| | | \$73,149 56 | | \$57,455 83 |
| Totals ----- | | \$101,037 44 | | \$87,793 71 |
| Less monthly bills----- | | 25,286 34 | | 26,383 61 |
| Balances ----- | | \$75,751 10 | | \$61,410 10 |

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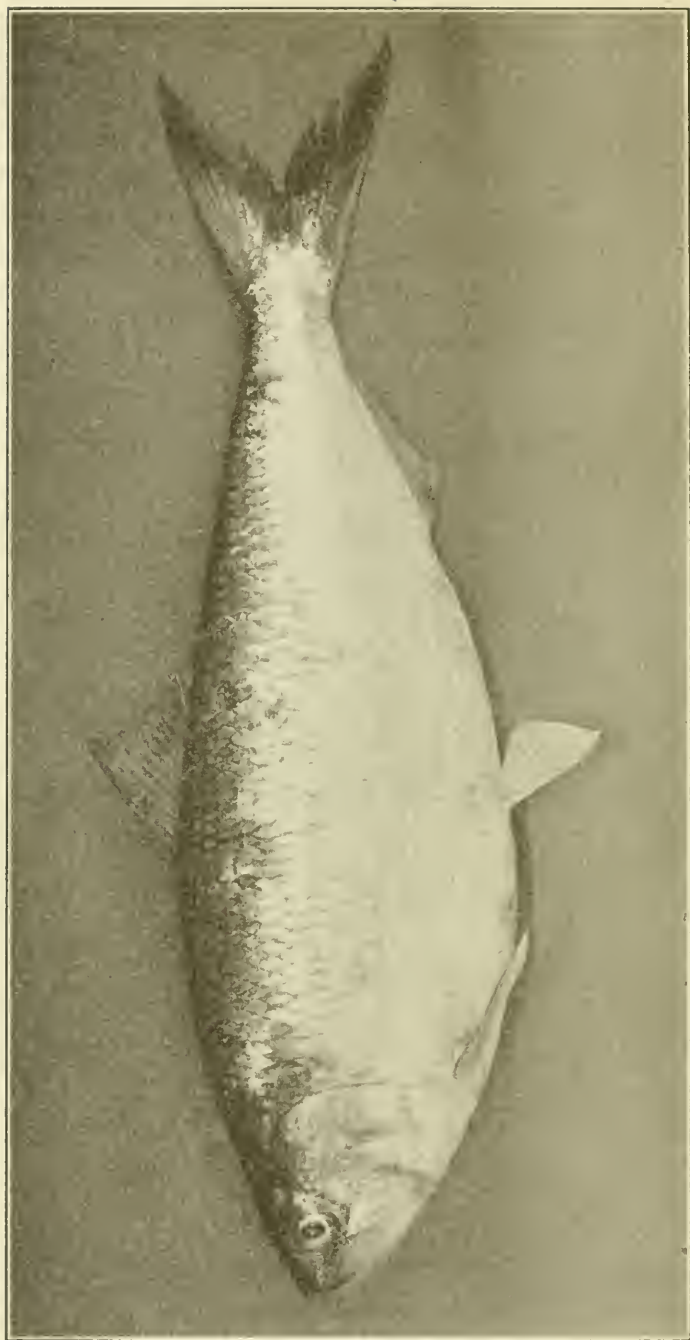


Fig. 15. Shad (*Clupea sapidissima*), an unappreciated food fish in California.

CALIFORNIA FISH AND GAME

" CONSERVATION OF WILD LIFE THROUGH EDUCATION "

Volume 2

SAN FRANCISCO, APRIL 15, 1916

Number 2

SHAD IN CALIFORNIA.

By H. B. NIDEVER.

The shad (*Clupea sapidissima*), which is found in such great numbers in the Sacramento and San Joaquin rivers, is not a native fish, but was introduced into our waters from New York about forty-five years ago (see Fig. 15). The undertaking of bringing out thousands of shad fry just hatched was one which seemed almost certain to result in failure, for fish culturists at that time had never tried anything approaching it in difficulty. The success of the experiment was



Fig. 16. Typical outfit of shad fisherman.

a great achievement in the art of fish culture and was due to the energy and initiative of the first California Fish Commissioners, Messrs. B. B. Redding, S. R. Lockmorton, and J. D. Farwell, and to the great skill of the famous fish culturist of Rochester, New York, Mr. Seth Green. Mr. Green and an assistant left New York on June 20, 1871, with 15,000 shad fry just hatched, contained in eight tin cans holding twelve gallons of water each. He arrived at Tehama on the Sacramento River on June 27, with 10,000 of the fry in good order. Upon liberating them he found, on putting some in a glass of river water, that they began actively to feed on some minute particles in the water. The dogs,

Mr. Green was afraid that the water, at that time very muddy on account of the mining operations, might not agree with them, but he hoped they might be wise enough to stay near the surface where the water was freer from mud. Accounts of this achievement were published in the report of the California Fish Commission for the biennial period, 1870-1871, and in the report of the New York Fish Commission

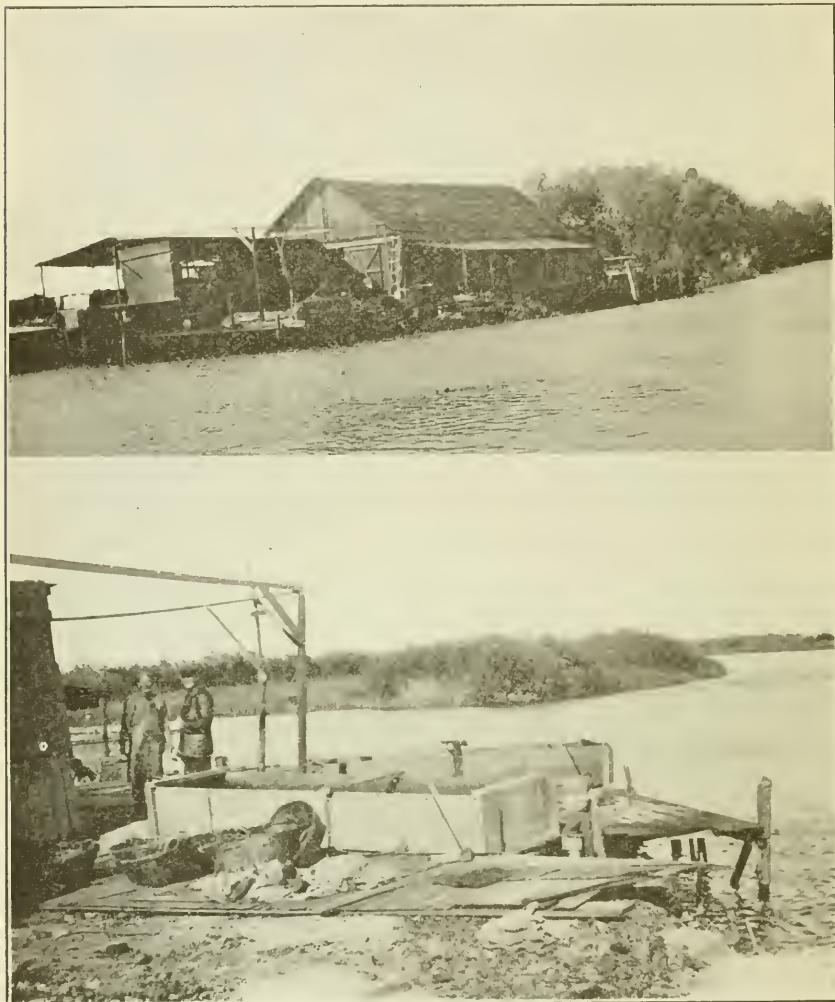


Fig. 17. Chinese shad saltery on San Joaquin River. Shad are salted here and exported to China.

for 1871. Extracts from these reports have been printed, along with such information regarding subsequent plants and their success, in a paper by Mr. Hugh M. Smith, entitled: "A Review of the History and Results of the Attempt to Acclimatize Fish and Other Water Animals in the Pacific States." This report appeared in the bulletin of the United States Fish Commission for 1891.

A second plant of shad was made by Mr. Livingstone Stone of the United States Fish Commission in 1873. This plant amounted to 35,000 fry planted in good condition in the Sacramento River near Tehama. All the subsequent plants of shad in California waters were made directly by the United States Fish Commission in the Sacramento River at Tehama. Between 1876 and 1880, inclusive, 574,000 fry were planted. The total number of young shad planted in the Sacramento River was 619,000. There have been no shad fry planted in California waters since 1880, and yet they are plentiful at the present time.

A few mature shad were caught in San Francisco Bay in 1873, the second year after planting. In 1874 and 1875 a larger number were caught. The number then steadily increased each year until in 1877 the California Fish Commission reported that they were becoming quite numerous. When the plants of shad were made the fry were taken up the Sacramento as far as Tehama before liberating because, as it was stated, "the instinct of the shad is, like that of the salmon, to return to spawn at the same place where it was hatched." The shad have not returned unerringly to the waters of the Sacramento, for the San Joaquin gets its full quota of shad and they are scattered along the coast, some having been taken in the Columbia River in 1876 and 1877. There is no question but that these shad in the Columbia resulted from plants made in the Sacramento River, for there were no plants made in the Columbia River or any place but the Sacramento River until 1885. The southern range of shad at the present time is Monterey Bay, although a few stray ones have been reported by fishermen as far south as Newport Beach, in Orange County.

Shad first appeared in numbers on the markets in California in the spring of 1879, when several thousand were sold in San Francisco. In 1886 the California Fish Commission estimated that in that year a million mature shad were taken from the waters of the State. From the time they were first introduced in our waters they have steadily increased until now they have, without doubt, reached their maximum height of production. When shad first became of real commercial value and were being sold in the California markets, the price was very high, as they were still quite scarce and the demand for this fish, then regarded as a curiosity, was very great. Instances are recorded where from \$10.00 to \$15.00 was paid for a single fish. Many brought from \$1.00 to \$1.50 per pound. By the year 1880, the number had so increased that consumers could obtain them for 20 cents to 25 cents per pound. By 1888 they could be obtained for 10 cents per pound, and during the height of the run the markets would become glutted and the price would fall to 5 cents per pound. As they increased from year to year the price gradually dropped until the wholesale price had fallen to 2 cents or less in 1894, about the same as we have today during the height of the run, and many fish could not be disposed of at any price. On the Columbia River the increase was about the same as on the Sacramento and the fall in price has corresponded to that in California. Just why this condition should have come about is perplexing. There can be no doubt that the shad have now the same good food qualities that they had when they were first caught in California when the retail price was \$1.00 a pound.

The latest available statistics on California fisheries are those of the Bureau of Census for 1908. In that year 1,169,000 pounds of shad were caught in this State which was valued at \$12,000.

From the time shad became abundant in our waters up to 1912 they were utilized almost entirely by fresh markets. But in the spring of 1912 several salting stations for shad were established on the San Joaquin River by Chinese companies (Fig. 17, *a* and *b*). These continued for only two seasons, for they did not seem to pay. Later a salt shad market was established in China and practically all the California fish were shipped there. Several local salmon packers have now taken up the dry-salting of shad and have packed many tons during the last two or three years, which they have sold through Chinese brokers in San Francisco. Fishermen get one-half to one and one-half cents per pound for shad during the shad run. The roe shad brings one-half cent more per pound because the roe is removed before the fish is salted and either



Fig. 18. *a*. Spawning grounds of the shad in the delta region of the San Joaquin River.
b. Fishermen's arks along the Sacramento River. These floating houses are the homes of the river fishermen for the greater part of each year.

canned, shipped East in cold storage, or sold fresh in the local markets. Considerable quantities of shad-roë have been canned on the lower Sacramento River during the last two years. During the spring of 1915, 100,000 pounds of shad roë were shipped or sold in local markets. 606,048 pounds of shad roë were canned in one-half pound cans, 5,400 cases of shad were canned, and 2,400,000 pounds round fish were dry salted.

The principal shad fisheries of California are in the upper San Francisco Bay and in the delta region of the Sacramento and San Joaquin rivers. The vast delta basin of the lower San Joaquin has proven an ideal spawning place (see Fig. 18, *a* and *b*). Shad are occasionally taken in Monterey Bay, but these are utilized by the fresh markets, for they are here taken when they are not running in large numbers in the rivers. Shad ascend the Sacramento River for 300 miles or more. Here they are caught in bass or salmon nets. Because of the inconvenience of shipping from this district and because of the low prices prevailing, extensive fishing is here hardly warranted, and often after the fish are caught they are dumped overboard.

Shad fishing in California is practically all done with drift gill nets having a drawn mesh of from $5\frac{1}{2}$ to $6\frac{1}{2}$ inches. The regular salmon boat (Fig. 16) and gear are used, but the gill net is of smaller mesh and of somewhat lighter twine. The nets are from 150 to 350 fathoms long and 25 to 65 meshes deep.

There is but one distinct run of shad into the Sacramento and San Joaquin rivers each spring and this lasts about three months, beginning about the first of March and lasting until the first of June. The height of the run is in April. A few shad, however, are taken in striped bass and salmon nets practically the year round.

It seems strange that with the occurrence of the shad in abundance in California its desirability as an article of food has fallen so low. Shad in the eastern states are considered a luxury, and the western shad is thoroughly equal in quality. It seems strange, too, that, considering the present high price of most of the other fish as well as the high price of meat, a fish with the food value of the shad should not be



Fig. 19. Mending shad nets.

put to more profitable use than dry-salting for the markets of China. The shad is more difficult to prepare because it is more bony than other fish, but the flavor is unsurpassed and should outweigh the difficulty of preparation. The feeding habits of the shad are likewise in its favor. This fish spends the greater part of its life along the ocean shore and feeds principally on shrimps, sand-fleas, and other crustaceans. It comes into fresh water for only a short stay during the spawning season and returns thereafter to the ocean. During its stay in fresh water it feeds but little, if at all.

The unpopularity of the shad seems traceable to three factors: first, the abundance makes this fish undesirable; second, the delicacy of the fish makes it more difficult and more expensive to get them to the consumer in attractive form; third, the boniness of the fish has prejudiced the public against it. All of these objections could be largely over-

of
dogs,

The glutted condition of the shad market at the height of the spring run can be relieved if the public can be made to realize the delicacy and the high food value of this fish and if they can be kept informed, through advertising, of the state of the market and of the low prices at which the fish can be bought. The difficulty of handling and shipping can also be remedied. Shad are now shipped in much better condition



Fig. 20. Fisherman unloading his catch of shad at Bouldin Island on the San Joaquin River.

than they were a few years ago and can be had in good sanitary condition any place in the State where a demand is created for them. The difficulty of preparing the fish and removing the bones can be obviated by proper splitting and dressing before cooking and by proper carving before the fish is served.

California should avail herself of her valuable resource of shad fisheries, a truly enviable resource which at the present she is, to a large extent, wasting.

DOES THE GRIZZLY BEAR STILL EXIST IN CALIFORNIA?

By JOSEPH DIXON.

[Contribution from the Museum of Vertebrate Zoology of the University of California.]

So conspicuous an animal as was the grizzly in the early days of California would seem hardly able to occur at large in any part of the State at the present time without the full knowledge of people living in the vicinity. Yet great tracts of wild mountain land, almost inaccessible and practically in its primitive condition, still exist in remote portions of California; and from time to time rumors reach the newspapers, and are eagerly printed, setting forth with more or less circumstance an encounter of some hunter with an alleged grizzly. In several instances where attempts have been made to "run down" these rumors, failure has resulted from inability to find the man or men said to have vouched for the story. The case dealt with in the present paper broke the record, in that as a result of the inquiry, not only the man was found, but the skull and head of the animal in question was secured for scientific comparisons.

On December 2, 1915, the State Fish and Game Commission received a letter from Deputy Fish and Game Commissioner H. S. Prescott, of

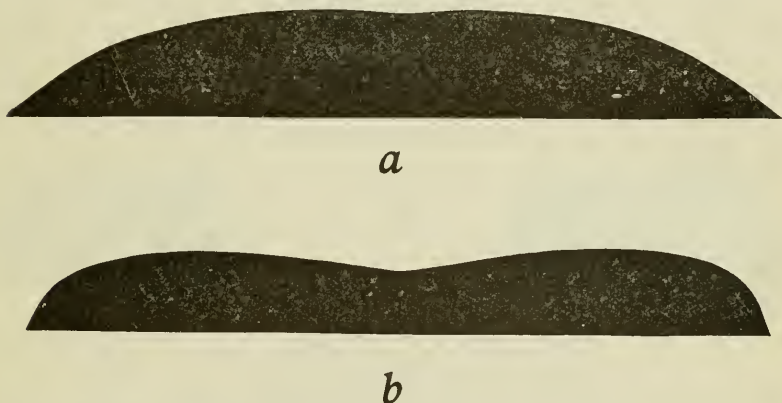


Fig. 21. Profile across top of skull between eyes; black and grizzly bears; natural size.
a. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool., head of Boulder Creek, Humboldt County, California.
b. Alaska grizzly bear, No. 4705, Mus. Vert. Zool., Yukon Valley, Alaska.

Crescent City, Del Norte County, California, to the effect that John McMillan, of Requa, in the same county, had informed him that a grizzly bear had been killed by Leslie Fearrien on "Tom Bair's Range," at the headwaters of either Boulder Creek or Redwood Creek, in Humboldt County.

On December 13, 1915, Mr. H. E. Wilder, of Carlotta, Humboldt County, wrote to the Director of the California Museum of Vertebrate Zoology detailing the following report, which had come to him. That the two accounts pertain to the same incident is obvious.

Mr. Fearrien, who is foreman and professional hunter on the Bair Range (stock ranch) on Boulder Creek, bayed a bear with a pack of twelve dogs; the animal refused to run, but calmly faced the dogs,

killing four and crippling others before the hunter arrived and shot him. All who saw the bear, including Fearrien, who had killed upwards of one hundred bears, commented on its peculiar color and great size. The skull also was claimed to be different in shape from any of the black bears killed in the region. They estimated the weight to be between 900 and 1,000 pounds. The head was taken home and weighed 50 pounds. Fat to the extent of 250 pounds was also taken home. The fur was in poor condition and the skin was not saved. According to this report as it reached Mr. Wilder, all who had seen it pronounced the bear to be a grizzly. Addresses and other useful information were supplied by Mr. Wilder.

The explicitness of the above two reports is seen to have been unusual, and hence to warrant extra effort in following them up. Letters were promptly written to all the parties concerned, without, however, within a reasonable length of time, eliciting any replies. Through the especial interest of Miss Annie M. Alexander, and at her suggestion, the writer was then detailed to go to Humboldt County and ascertain the facts. The trip occupied the period from January 13 to 18, 1916.

Fortunately I was able to find both of the men most intimately connected with the incident: Mr. Albert L. Fearrien, who shot the bear, and Mr. Fred Bair, who mounted and now owns the head. The former was in Eureka at the time of my visit, the latter at his ranch on Mad River, near Maple Creek post office. Through the kindness of Mr. Bair I was enabled to take the mounted head back with me to the museum at Berkeley where the skull could be removed, examined and compared with the numerous specimens of grizzly, black and brown bears in the museum so that its identity might be established with certainty. Mr. Fearrien related the essential facts of the case to me, as follows:

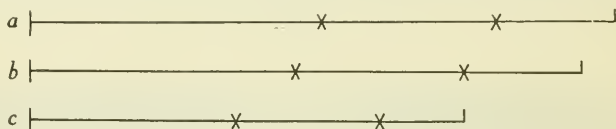


Fig. 22. Relative length of the three upper back teeth in grizzly and black bear skulls; natural size.

a. Grizzly from Idaho, No. 4832, Mus. Vert. Zool.

b. Alaska grizzly, No. 4705, Mus. Vert. Zool.

c. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool.

The bear, a large male, was killed about six miles below the head of Boulder Creek, a tributary of Mad River, Humboldt County, California, on November 6 or 7, 1915. Fearrien was out with the dogs hunting for coyotes. The dogs struck a "hot" trail and disappeared around a bend in the river, while Fearrien struck across the ridge in the hope of heading them off. He found he could not cross at this point, however, and so turned back and followed along the bed of the stream. All five dogs were heard when they first bayed the bear, but soon only two were barking. At this point five more dogs were turned loose and they reached the bear in advance of the hunter. The latter did not know that it was a bear, not a coyote, until he arrived at the scene of combat, after a hard scramble over rough rocks. As he rushed up he saw the dogs fly at the bear's neck, and saw the bear seize them one after another with his paws and chew them to pieces. Six dogs were killed before the third shot struck the bear in the neck and ended the

fight. The dogs were accustomed to taking hold of ordinary bears, and flew unhesitatingly at this one, only to find that it proved too much for them.

Upon skinning the bear Fearrien found that the first two bullets of the 30-40 (1906 rimless) had gone through the bear's body behind the shoulders, one bullet going clear through while the other lodged in the shoulder blade on the farther side. The dead bear was dragged or rolled out on a gravel bar and skinned. The head and part of the neck attached was taken to the ranch without being skinned and "weighed 50 pounds." The fat that was saved "weighed 250 pounds," while the bear was *estimated* to have weighed about 950 pounds when alive.

Numerous cattle had died on the higher ranges from eating larkspur, Mr. Fearrien said, and he attributed the fatness of the bear to this plentiful food supply. The ranchmen had seen and heard nothing of this particular bear previously; he had certainly not been bothering the sheep, as far as they knew, although they had sustained considerable damage from bears at one time or another. The pelage of the bear consisted only of guard hairs with little or no under fur, so the skin was considered of little value and was given to an Indian to tan. It spoiled during the process, and when someone went to get the claws he was informed that the skin had washed away down the river.

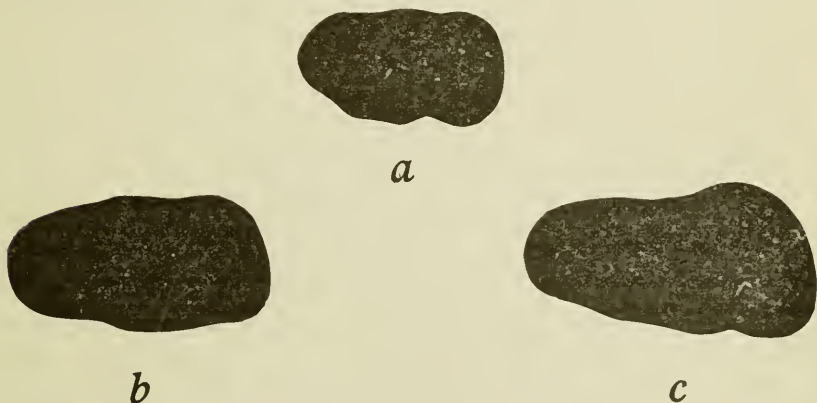


Fig. 23. Outline of left back upper molar tooth in black and grizzly bears; natural size.

a. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool.

b. Alaska grizzly, No. 4705, Mus. Vert. Zool.

c. Grizzly from Idaho, No. 4832, Mus. Vert. Zool.

None of the men that I interviewed were in favor of protecting bears as big game mammals. They were men who lived in the eastern part of Humboldt County on the land that they owned and upon which they paid taxes. These men were the ones who were in closest contact with bears the year through. As the principal industry of a great part of that country is stock and sheep raising, it is no small wonder that there is little sentiment in favor of protecting bears. The professional hunter and trapper, or city sportsman, would doubtless view the matter from a different angle. The impracticability of raising bears, hogs and sheep on the same range seems too evident to merit discussion, and the sentiment of the cattlemen was crystalized by Mr. W. J. Gordon, of Carlotta, who has been engaged in the sheep business for nineteen years, when he said: "They will be wanting to protect the coyote next."

That bears, of the black or cinnamon group, are far from extinct in Humboldt County, will be easily proven to anyone who will take a trip through the back country. He will probably actually see no bears, for they have learned to keep out of sight; but tracks in the road made during the night are of every-day notice, and during the winter season mangled sheep give gruesome evidence of their presence. According to Mr. Gordon, a large part of the damage is caused by the sheep becoming panic-stricken when a bear invades a flock, the sheep thereupon stampeding, often jumping off high banks or piling up in deep gullies in their mad haste to escape.

That true grizzlies once occurred quite commonly in the more open parts of Humboldt County, such as the Eel River Valley, seemed to be abundantly borne out by what numerous old settlers told me, and inasmuch as the stories coincided as to essential facts, I see no reason for doubting them. I could not ascertain any definite records of real grizzlies having been killed in the county during the past 26 years, and most of the grizzlies referred to were killed 40 and 50 years ago.

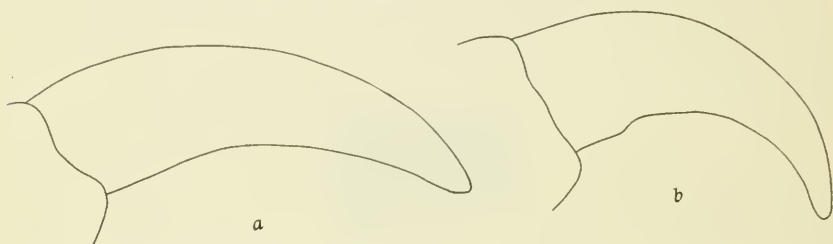


Fig. 24. Outline of typical claws of grizzly and black (cinnamon) bears from California; twelve-thirteenth natural size.

a. Third right claw (front foot) of grizzly from Kern County.

b. Third right claw (front foot) of black (cinnamon) bear from Siskiyou County.

The skull of the Humboldt bear which was at the bottom of the present inquiry, upon being removed from within the mounted head, revealed characters which placed it at once and clearly with the black (or cinnamon) group of bears and not with the grizzlies. As an example of Mr. Fred Bair's generosity, so well known in the region, the skull upon which this investigation is based is now number 22978 in the California Museum of Vertebrate Zoology at Berkeley, where it can be examined by whomever wishes at any time in the future. The brain case, above the eyes, is very high and rounded, with a slight medial depression (see Fig. 21, a). This "high-brow" character of the black bears of the North Pacific Coast region has been noted by scientists and has been deemed of such importance that this form of bear has been called *Ursus americanus altifrontalis*, or "high-browed" black bear. Contrasting to this, the usual grizzly bear skull is flattened, with a decided depression or trough between and above the eyes (see Fig. 21, b). The Humboldt skull, like other black bear skulls, has a very short muzzle as compared with the grizzly skulls. The size of the back teeth or molars is much greater in grizzlies than in black bears. The upper back molar is extreme in this particular (see Fig. 23, a, b and c), and even in skulls of approximately the same size, this tooth is usually about one-quarter of an inch longer in a grizzly than in a black bear.

The longest upper back molar of a black bear that I have found in the museum collection measured, in length, one and three-sixteenths inches, or thirty millimeters. The shortest corresponding tooth that I have found in an adult grizzly was over one and five-sixteenths inches, or thirty-four millimeters in length. The combined length of the three upper back teeth seems to be a good index to the length of the muzzle of the bear. In adult grizzlies these teeth measure at least one-half inch more, in length, than the corresponding teeth in black bears. This difference is shown in Fig. 22, *a*, *b* and *c*.

Considerable importance was attached by local people to the high ridge or sagittal crest on the Humboldt skull. This feature is pretty sure to be an age character, however, and seems to be most highly developed in old males. It is not a distinctive grizzly character, as it is often considerably higher, in proportion to the size of the skull, in certain black bears than it is in many grizzlies.

The claws of the front paw of a California grizzly from near Fort Tejon, Kern County, are long and only slightly curved (see Fig 24, *a*), while those of the black (or cinnamon) bear average shorter and are much more curved (see Fig. 24, *b*, which is a typical northern California cinnamon bear claw).

As far as California is concerned, brown or cinnamon bears may be considered as of the same species with black bears. They have been generally believed to be simply color phases of the black bear. The pelage of the Humboldt bear was cinnamon-brown on the neck and head, with the hairs about the nose and lips much lighter in color.

No one regrets more than we do here at the Museum of Vertebrate Zoology, that the Humboldt bear turned out to be a black bear instead of a grizzly, as especial watch has been maintained for several years in hopes of securing a complete grizzly (skull, skin and skeleton) from California, which might thus be preserved for the State as an example of what was once our most noteworthy mammal. *Definite* information regarding either the past or present occurrence of grizzly bears within the State will therefore be much appreciated if sent to the Museum of Vertebrate Zoology, University of California, Berkeley, California. Any large, brownish bear with long, slightly curved claws and the following skull characters is worthy of being brought forward as a grizzly candidate: (1) a long muzzle and low forehead with depression or trough above and between the eyes; (2) three upper back teeth, totaling more than two and three-quarters inches in length; (3) upper back tooth measuring more than one and one-quarter inches in length.

February 5, 1916.

THE CALIFORNIA VALLEY ELK.

By BARTON WARREN EVERMANN,

Director of the Museum, California Academy of Sciences.

In CALIFORNIA FISH AND GAME for April 10, 1915 (Vol. 1, No. 3, pp. 85-96), a brief account was given of the former distribution and abundance of the California valley elk (*Cervus nannodes*). In that article evidence was presented convincingly showing that this fine animal formerly ranged over the entire San Joaquin Valley and adjacent foothills, and through Livermore and Suñol valleys across to the Santa Clara Valley and even to Monterey where Don Sebastian Viscaino found them abundant when he landed there December 10, 1602. Evidence was also presented showing that the range of this elk extended well up into, if not throughout, the Sacramento Valley.

Throughout most of its range the species was very abundant in those early days and it continued to be abundant in the San Joaquin Valley at least as late as the early fifties. With the rapid increase in popula-



Fig. 25. California valley elk in corral at Buttonwillow, Kern County, ready for shipment. Photograph by John Rowley.

tion of California following the discovery of gold, the elk had a hard time of it, and their numbers rapidly decreased. Through persistent and more or less constant harassment they were soon driven out of the foothills and down into the valley where they found, when too hard pressed, a comparatively safe retreat in the tule marshes. But even there they were not secure. The eager hunters soon devised ways and means by which the animals could be followed into the tule lands, and their numbers went on decreasing. In the early seventies it is said only a few individuals were left of the once vast herds which only a decade or two before had roamed over the great interior valley. One report has it that there was but a single pair. This may not be literally true, but it doubtless correctly states the general fact that the species was almost extinct.

Then it was that a man of vision came upon the scene and saved this magnificent animal from complete extermination. That man was Henry Miller, the founder of the great cattle company of Miller and Lux, the greatest company of the kind in America, if not in the world. It was Henry Miller who saw the fate which inevitably awaited the California valley elk unless prompt action were taken to protect the few animals that were left. Fortunately, the few remaining elk made their last stand in the southern part of the San Joaquin Valley in the vicinity of what is now called Buena Vista Lake, and on land owned or controlled by Miller and Lux. There they had been able to secure a measure of safety in the willows and tules, but it was Mr. Miller's strict orders to the employees of the company that the elk must not be disturbed under any circumstances, that saved them.

In the article to which reference has been made, it is told how the herd increased in numbers until in 1914 there were probably more than 400 animals in it, how the herd was doing considerable damage each year to the alfalfa and Egyptian corn fields on the Miller and Lux Kern County ranch, and how the California Academy of Sciences undertook to reduce the herd somewhat by transferring some of the animals to suitable places in other parts of the State. It was believed that herds could be established in a number of reservations and parks in the State where they would thrive and thus establish several new centers for the propagation and preservation of the species. The thought was to increase as much as possible the conditions favorable to the preservation of the species. In pursuance of this policy 54 elk were distributed in the fall of 1914 to seven different reservations and parks. Many requests for elk could not be supplied at that time, the number of animals Messrs. Miller and Lux were able to capture not being enough to go around. Those who could not be supplied in 1914 were quite anxious to secure some of the elk and it was decided to make another distribution in the fall of 1915. This was done. Messrs. Miller and Lux again built a large corral near Buttonwillow in a field to which the elk were in the habit of coming at night to feed. The same method was followed as was pursued the previous year. A total of 100 animals were captured and 92 of these were distributed to 14 different places.

In order that the record may be complete there is given herewith a list of all the shipments for the two years, together with the available data regarding the present condition of the various herds. The distribution in 1915, as in 1914, was under the immediate direction of Mr. A. L. Bolton of the California Academy of Sciences.

Elk distributed in 1914 by the California Academy of Sciences:

1. Private unfenced reservation of 1,000 acres in the Santa Monica Mountains near Los Angeles, owned by Mr. J. M. Danziger, of Los Angeles, 3 males and 3 females.

On October 28, 1914, Mr. Danziger reported: "I believe the elk are going to stay where they were put on my place. They were seen the next day and I have traced their tracks up and down the road to water, which indicates they are staying there, and I hope they will become acclimated. My foreman was cutting alfalfa today, and one elk stood watching him at close range. If you can arrange to get me two more young ones, I shall be more than pleased."

On February 8, 1916, Mr. Danziger wrote: "We have not seen the elk for a long time. Since the winter rains came on, they apparently get all the feed they want in the mountain ranges, and do not come into the canyon. Of the elk that were shipped, I know that two have died. One got across the great valley between the mountain range in which I am situated and the range back of Playa del Rey. When I heard about this I sent a man to look after it, but the elk had either been shot or it died from lack of water. Then on a very foggy day when we could not see the city from our hills, one of the elk strayed away down across the inhabited valley just on the outskirts of the city of Los Angeles, and then people began chasing the animal and chased it clear into the heart of the city where it was finally lassoed by a motoreyele policeman, but it soon died."

2. Private reservation of 640 acres (enclosed with elk-proof fence) in the Santa Monica Mountains, near Los Angeles, owned by Mr. E. L. Doheny of Los Angeles, 6 males and 4 females.

A report dated February 8, 1916, says these elk are doing well, and that several of them will have fawns very shortly, if they do not already have them. He can handle a few more at any time. The advantage is that his are within the great enclosure and can be seen at any time.

3. Private park of 700 acres belonging to Mr. S. C. Evans, of Riverside, 1 male and 3 females. This park is at the edge of the city of Riverside and is essentially a city park. On January 11, 1916, Mr. Evans wrote: "The four elk received by me have always done well and have never given me any trouble nor shown any inclination to jump the fence. These elk have become quite tame and are certainly a great attraction. I do not, however, think it safe for anyone to go inside the enclosure, at least without keeping a close watch, as the big bull will come toward one. His horns have come out very nicely and will soon be shed. One of the cows died without any apparent reason. She never did get as fat as the others, but seemed to be in good order and never showed any indication of sickness—we simply found her dead one morning. Up to the present time no fawns have been born, and I think perhaps I had better enlarge the enclosure to give them a little more exercise. (Up to this time Mr. Evans kept the elk in an enclosure of but a few acres.) I would very much like to receive two more. If at any time you are shipping grown ones this way and can not get young ones, I shall be glad to get the old ones, as I am anxious to make this a success."

4. Balboa Park, San Diego, 8 males and 4 females. On February 22, 1915, Mr. J. B. Pendleton, secretary of the Board of Park Commissioners, write: "Regarding the elk, I beg to advise that some of them seem to have been badly bruised either in catching them or in the corral, or in transit; three have died and two others are in bad shape. The elk have a splendid corral, are well cared for, and have become very tame. They create a great deal of interest among visitors. Those that remain should do well. We hope you may be able to furnish us a few more female elk."

5. Enslin Park, Modesto, 2 males. This is a city park containing about ten acres. Two males were supplied because in the 1914 shipments we had a surplus of males. On January 18, 1916, Mr. H. S. French, secretary of the Modesto Elks Lodge, which organization furnished the elk to the city, wrote: "I wish you could see the elk now. They have grown wonderfully and seem quite content and healthy. One had the misfortune to break about six inches off his first pair of antlers. They are quite tame. They will come to the fence and eat from your hand, if you offer them anything they really want. Their feed consists mostly of alfalfa hay and meal, crushed barley, and quite often vegetables of which they are very fond.

"We are very anxious to get two females and hope you may be able to supply them. At present the enclosure for the elk is a fraction under two acres, but if we receive the females the park commissioners will double the area."

6. California Redwood Park Association, Boulder Creek, Big Basin, 5 males and 5 females. On November 3, 1914, Mr. H. L. Middleton, a member of the Association who has taken an active and intelligent interest in stocking the Big Basin with elk, wrote: "We succeeded in transporting the elk from the car to their future home without serious accident to any of the animals with the exception of the very young one (a female) which died the day following their release. The two bucks fought viciously at times in the wagon, but since being liberated they seem to give one another no trouble."

On November 14 Mr. Middleton reported that another (a male) had died. "We are feeding the animals wheat and oat hay and have recently added alfalfa to their diet. They seem to eat well."

7. Del Monte Park, Monterey, 5 males and 5 females. This is the large reservation of the Pacific Improvement Company of 6,000 acres, through which runs the famous Seventeen Mile Drive. The elk were supplied to this park at the instance of Mr. Ney Otis, of Monterey, on behalf of the Monterey Elks lodge.

On November 19, 1915, Mr. S. F. B. Morse, general manager for the Pacific Improvement Company, reported: "The elk that we have are doing very well, indeed. I saw them only last Saturday and they were in splendid condition. We need more females and would like very much to receive some from you." A week later Mr. R. H. McKaig of the Pacific Improvement Company reported: "Of the ten elk turned loose in the forest last fall, one young doe died shortly afterward and we think she must have been injured in transit. One calf has been born and one cow is missing; we think she has been hiding with her calf somewhere in the forest and will join the herd later. We frequently see nine. They make their home in the sand dunes near the ocean. The last time I saw them they were very fat and healthy looking.

"We have heard of only one instance of any of the animals wandering away; that was when a bull wandered out of the forest into an alfalfa field in Carmel Valley, but he returned to the herd within 36 hours.

"The elk seem to be getting tame very fast. I have stopped my car within 50 feet of the whole herd and they did not seem at all troubled. As you doubtless know, the game in our forest is protected by rangers and we allow no shooting and no dogs."

On January 4, 1916, Mr. McKaig reported that the herd was in good condition. One calf had been born (sex not determined) and doing well. One adult female still missing. The animals find an abundance of food and it has not been necessary to feed them.

Elk distributed in 1915 by the California Academy of Sciences:

1. Mooney Grove, half way between Visalia and Tulare, 1 male and 3 females. This is a public park under the management of the Tulare County Board of Forestry, of which Mr. Thomas Jacob is the efficient acting president. It was through Mr. Jacob's interest in the matter and that of the Visalia Elks lodge that the elk were secured for this park.

On November 26 Mr. Jacob reported: "The four elk arrived in fine shape and were turned out in the park (10½ acres), an ideal place for them, I think; plenty of grass, water and shade."

2. Roeding Park, Fresno, 1 female. This park contains a total of 117 acres, of which about six acres were enclosed for the elk. The local Elks lodge co-operated with the city park commissioners in securing the elk. They desired two males and two females, but it was convenient to supply only one at this time. It is understood they already had a bull elk secured from some other source.

3. Zapp's Park, Fresno, 1 male. This elk was sent at the request of Mr. W. D. Wallis, of Miller and Lux Company. On January 13 Mr. Zapp reported: "The elk you sent me is doing fine. He has the run of ten acres. I also have a female; lost a male this summer. I received the pair five years ago from my uncle's ranch at Chico—the John Crouch ranch, four miles south of Chico on the Dayton road. I have never raised any young; I don't know from what cause."

4. Private park of P. H. Loinaz, Fresno, 1 male and 1 female. sent at the request of Mr. E. F. Ogle, of Miller and Lux. Reported to have arrived in good condition and doing well.

5. Private reservation of Mr. A. V. Lisenby, of Fresno, 1 male and 2 females. This ranch is in Madera County, eight miles from Friant. It consists of 1,800 acres in one tract and 320 in another near by. The elk arrived in good condition and were temporarily placed in an enclosure of about two acres which has since been enlarged to about 15 acres. Mr. Lisenby on January 4 reported that he was feeding them alfalfa hay and that they seemed to be doing very well indeed.

6. Alum Rock Park, San Jose, 2 males and 2 females. Mr. John Varcoe and Dr. Fred A. Curtiss, representing the Elks lodge of San Jose, and Mr. Walter L. Chrisman of the Board of Alum Rock Park Commissioners, co-operated in securing these elk for Alum Rock Park. This park is about seven and one-half miles northeast of San Jose. The elk were liberated in an enclosure of seven or eight acres. Mr. Elmer J. Ware, the park superintendent, reported on January 14 that "the four elk donated to Alum Rock

Park by the California Academy of Sciences reached the park in good condition and are doing very well." On February 23 Mr. Ware reported that "one of the male elk died last week. Do not know just what was the cause. The others are doing very well."

7. Petaluma City Park, 2 males and 10 females. Mr. E. B. Dykes, supervising principal of the Petaluma public schools and secretary of the Board of Park Commissioners, was active in securing this shipment for the city of Petaluma.

On December 21 Mr. Dykes wrote as follows: "One of the elk (a doe) sent us, died. It was in bad condition when delivered. We had a veterinary attend the animal but were unable to save it. He found, on examination, that its kidneys were in bad condition. It is possible that an injury was received in the car. The balance of the herd is apparently in good condition. The veterinary advised that we feed them less alfalfa. Will you please send me a number of copies of the article you published in CALIFORNIA FISH AND GAME on the Elk of California? I wish to interest the children in them."

On January 19 Mr. Dykes reported that the old buck which had had his horns removed had died. Mr. Dykes thinks both that died "were in bad condition when received and gradually grew worse. We were very sorry, indeed, to lose the big buck."

8. Eden Valley Ranch, Mendocino County, 2 males and 10 females. This ranch consists of about 25,000 acres, about 60 of which are under elk-proof fence. The ranch is owned by Hon. Wm. G. Henshaw and Mr. Henry D. Nichols, and is about thirty miles northeast of Willits.

On January 3 Mr. Henshaw reported that: "so far the elk are doing well." On January 27 he reported that 9 of the 12 had died. The winter in that region has been unprecedentedly severe, with the worst storms and heaviest snows that have been known for years.

When the shipment was made to this place it was realized that it was in the nature of an experiment and that the chances that the elk would survive were not good, the climatic conditions, the whole environment, being so decidedly different from that of the natural habitat of this species. Nevertheless it was felt to be worth while to try the experiment.

9. Del Paso Park, Sacramento, 3 males and 9 females. This park contains about 850 acres and is about five miles northeast of the city on the Auburn boulevard. The elk were secured through the co-operation of Mr. Frank F. Atkinson, secretary of the Board of Park Commissioners, and Mr. Walter Leitch, secretary of the local Elks lodge.

The elk arrived in excellent condition and were placed temporarily in an inclosure of a few acres. On December 4 Mr. Leitch wrote: "At a regular session of this lodge, held November 30, 1915, I was instructed by unanimous vote, to express to the California Academy of Sciences the thanks of this lodge for the magnificent herd of elk that was presented to our city by you through

the co-operation of Messrs. Miller and Lux. The animals arrived in excellent condition and have been placed in Del Paso Park where I can assure you they will be given the best of care and attention."

On January 5 Mr. Atkinson wrote that "One of the elk was so severely injured in transportation that it had to be killed shortly after arrival here. Our herd now consists of eleven head, all in good condition. We wish to thank the Academy of Sciences and Messrs. Miller and Lux for the courtesy extended in this matter and to assure you of our appreciation of the same."

10. California Redwood Park Association, Boulder Creek, Big Basin, 4 females. sent at the instance of Mr. H. L. Middleton, manager of the California Timber Company.

These animals apparently did not arrive in good condition. One of them died within a few days, and two others died some time before January 19.

In handling this shipment the railroad unfortunately took the car on to Santa Cruz and then returned it to Boulder Creek, thus keeping the elk on the road a needlessly long time.

11. Laveaga Park, Santa Cruz, 2 males and 4 females. This park is a public one belonging to the city. It comprises about 1,000 acres and is about one mile northeast from the city. About 25 acres have been enclosed with elk-proof fence.

It is said that the elk arrived in good condition and are doing well.

12. Casa del Rancho, near San Felipe, belonging to Mr. J. F. Dunne, 1 male and 4 females. This ranch comprises about 15,000 acres, and is entirely enclosed and protected from trespassing. The elk are temporarily placed in a lot of three or four acres, but will later be given a much larger area. On February 7 Mr. Dunne wrote that the elk were doing quite well.

13. Vancouver Pinnacles National Forest Reservation, 1 male and 3 females. This is a large national reservation of some 14,000 acres, in San Benito County. The shipment was made at the request of Mr. Elmer Dowdy, county clerk of San Benito County. Hollister, Mr. A. T. Hain, of Cook, and Mr. Henry Hollaway, of Gilroy.

No report has yet been received as to the condition of this shipment.

14. Balboa Park, San Diego, 3 males and 19 females. This is the large park of the city of San Diego. The shipment was made at the request of the Board of Park Commissioners through its secretary, Mr. J. B. Pendleton. The commissioners and the city were so well pleased with the small herd sent them in the fall of 1914 that they were anxious to receive more. They were particularly desirous of securing more females. No formal report has been received as to the condition of the herd, but people who have seen them say they appear to be doing well and are a great attraction not only to the citizens but to the visitors to the Panama-California International Exposition.

From the above it appears that the Academy has distributed 146 elk among 19 different reservations and parks in the State; that of this number 25 have died as a result of injuries received while being caught or because of unfavorable climatic conditions, or from unknown causes; that at least 3 fawns were born in 1915; and that the animals now in the various reservations and parks total at least 124.

The California valley elk is an extremely wild and nervous animal under natural conditions and peculiarly liable to receive injury in handling. It is regretted that several were lost, but the number is no greater than should be expected in handling animals of such delicate organization. When these elk become adjusted to their new environment it is hoped and believed their rapid increase will soon more than make good all losses that may have occurred.

It is estimated that the number left in the Kern County herd is between 350 and 400. These, together with those in the new potential centers of increase, assure with reasonable certainty the preservation of the species. In some of these centers it is believed they will become common within a few years. In the meantime the Kern County herd will go on increasing and will continue to do large annual damage to the alfalfa and Egyptian corn fields of that region.

THE NEED OF CO-OPERATION IN FISH AND GAME PRESERVATION.*

By ERNEST SCHAEFFLE, Executive Officer, California Fish and Game Commission.

It is generally believed that almost any evil may be remedied through the enactment of a law and by the subsequent enforcement of the law by the police authorities. Ask the sportsman what he considers necessary to prevent the too rapid killing off of a species or what is desirable to accomplish the increase of another species and he will, nine times out of ten, reply: "Why, just pass a law shortening the season or one reducing the limit and then make the responsible officers enforce it, and the thing is done."

We have come to realize, however, that the thing can not be done so easily as it might seem. We certainly have plenty of fish and game laws; most officers are conscientious, reasonably well informed and intelligent; but still we are compelled to realize that laws are being violated every day and that the fish and game supply is suffering correspondingly.

Having thus admitted that police methods are not entirely sufficient in their present development, it becomes easier to work out the problem, ascertain each weakness, and prescribe the appropriate remedies.

It is axiomatic that no law is enforceable unless it really represents popular will. Furthermore, few laws are rigidly enforced unless the police officer feels that the public very strongly wants to have them enforced. Now, in the case of fish and game statutes, it at least seems that they have not always expressed public desire, and it is furthermore certain that the public does not, even yet, demand of every

*Reprinted, with permission, from *Pacific Outdoors*, February, 1916.

responsible official that he do his duty by preventing and punishing infractions. In most cases, we have reason to believe, the regular fish and game warden not only is alert to prevent unlawful fishing and hunting, but expends even more than reasonable effort in the endeavor to apprehend and prosecute violators. But with the average sheriff, constable, marshal, policeman (including their many deputies), the case is radically different; these officials make no attempt to enforce game laws.

The State Fish and Game Commission tries to obtain a record of every prosecution made in the State for violations of the so-called "fish" and "game" laws. It is probable that the record obtained omits the inclusion of less than twenty-five cases annually, while it shows a total of around one thousand in each of recent years. As a mere matter of information, the following table is shown. It indicates the number of cases made since 1902, with a total around 10,000:

| | |
|-------------------------------|-------------|
| Biennial period, 1902-04----- | 550 cases |
| Biennial period, 1904-06----- | 774 cases |
| Biennial period, 1906-08----- | 1,192 cases |
| Biennial period, 1908-10----- | 1,771 cases |
| Biennial period, 1910-12----- | 2,063 cases |
| Biennial period, 1912-14----- | 1,993 cases |
| Yearly period, 1914-15----- | 983 cases |

For the calendar year 1915 cases made totaled 1,057.

This record is highly gratifying to everyone connected with the State Commission; it is believed that few states can show so good a record; but the chief value the figures have, to the writer's mind, is their potential power to arouse in the sportsman a determination that every police officer in the State shall in future do his full duty. Exact figures are difficult to obtain, but it is believed that the hundreds of sheriffs and constables must have at least twenty-five hundred salaried and unsalaried deputies. Each of these men has authority to enforce the "fish" and "game" laws, which comprise merely a small, withal important, chapter in the Penal Code of the State. Moreover, each and every one of them has taken his solemn oath to enforce the laws of the State. Whenever he fails or refuses to enforce a "game" or "fish" law, he violates his oath and is answerable to the public, and particularly to the sportsmen and others who are directly and most earnestly interested in keeping up the supply of wild life.

Now, there is something quite definite that the sportsmen—singly and collectively—can do to bring about a better condition. The sportsmen certainly favor law observance and enforcement, and by reason of their present intimate knowledge of the work of the State Fish and Game Commission realize that the seventy-five wardens maintained by the State can not be expected to deal with the possible and actual law-breakers scattered through the fifty-eight counties. What the sportsmen can do—and will do as soon as they are awakened to the needs of the situation—is to demand of every police officer the same interest and action that is demanded of the regular game warden. When the country constable learns that the sportsmen among his constituents will no longer tolerate his passive condition he will "stir himself" and treat fish and game cases as he treats larcenies and other serious offenses whose importance is due largely to public opinion concerning them. When we consider the average person's regard for property it is diffi-

cult to understand the apathy of the public, so far as fish and game is concerned. Undoubtedly, the conservationist's greatest work is to convince the American public that the wild life is public property, of value to the public, and deserving of even more attention and protection than is purely private property.

HABITS AND HUNTING OF THE SEA OTTER.

By CHASE LITTLEJOHN.

In the early days when venturesome navigators found their way to the shores of the northern Pacific, sea otter were found in great numbers on the Alaskan coast and southward as far as Lower California. At the present time what a change is found! Of the thousands formerly existing only single individuals are now found, and these are being killed so fast that total extinction seems but a short time away. So rare has this animal become and so prized is its fur that a skin which in 1880 sold for from \$100 to \$155, has now advanced to \$1,500 and \$2,000.

When Behring first visited Alaska from 1760-1765 he wrote that sea otters were so numerous that the Aleuts wore long mantles of their skins and the best ones could be purchased for a scrap of iron. In 1804 Baranov sailed from Alaska with a single cargo of 15,000 skins, and at the time the Fur Seal Islands were discovered two sailors killed 5,000 the first year. The next year less than 1,000 were taken, and from the end of the next six years until the present time not a sea otter has been known there. And so it has been at the other spots where otter were once abundant. In 1873, when the Americans purchased Alaska, nearly 4,000 skins were secured, and in 1880-1881, because of the persistency with which the animals were hunted by both whites and natives, between 6,000 and 8,000 were taken, some of which I myself secured and thus helped, I am ashamed to say, in the general extermination. By 1890 the use of the modern rifle and destructive nets had so reduced the income to be derived from sea otter hunting that the hunters were obliged to engage in other occupations.

Thirty-eight years ago, on the 18th of March, I sailed on my brother's ship on my first sea otter hunt. We sailed from San Francisco by way of the Sandwich Islands. The Kuril Islands were reached in May and we at once began the hunt. And truly exciting and dangerous sport it was! To hit with a rifle so small a mark as an otter's head (practically the only part to be seen) from a bounding boat was at first no easy matter; but with practice the otter soon stood but little chance when hemmed in between the boats. The hunting was both difficult and dangerous, for the waters about the Kuril Islands are at nearly all times very rough because of the violent winds and rushing tides. I saw one hunter caught in a tide-rip: his boat stood on end for a moment and then plunged beneath the surface. Many lives were lost in this occupation, and of the hundreds who followed it for a long period I am perhaps the only one left who can tell from personal experience about the life and habits of the nearly extinct sea otter. My own brother with his crew of about thirty men were the last otter hunters, so far as I know, to sail from San Francisco. The expedition left on March 1, 1889, and like many another unfortunate ship that sailed for the same purpose, was never heard from again.

The sea otters were hunted always with three boats which formed a triangle, one boat ahead, and one on either side. When an otter was sighted, the hunter seeing it raised a paddle as a signal and all three boats would move off toward the animal. After approaching to within a reasonable distance, a shot was fired. The bullet, which usually struck near the animal, would so frighten him that he would dive at once, without taking time to inflate his lungs enough to take him any great distance. He could, therefore, not remain long beneath the surface. If he had taken time to draw a long breath he might have gone so far as to have entirely escaped the hunter's sight. If the animal was not captured after the first dive he was but rarely seen again. Swiftmess of action is of the utmost importance in sea otter hunting. This accounts for the fact that three boats were always used. More boats would have caused too much complication; they would have been constantly in each other's way, the lives of the hunters would have been endangered by the firing, and the precaution needed to prevent loss of human life would have allowed the otter to escape. He would then have been given time to inflate his lungs sufficiently to make a long dash and possibly evade the hunter. When the otter is killed he floats, back up, and the body takes the shape of an inverted letter U, both ends down. This position causes the air to remain in the lungs and to act as a float. If by any chance the air escapes the body at once sinks and is lost.

Many of the otters not killed with a rifle were taken in nets. These were of large mesh and about six fathoms long and two fathoms deep. They were anchored at one end so as to allow them to swing with the tide and with the wind, which blew at times with terrific force. These winds were advantageous to the hunter, for it was during the wind storms that the otters were forced to seek shelter behind the reefs and rocks where the nets were spread. At night, when the animals dove for food, they were unable to see the nets and were soon enmeshed. In struggling to free themselves from this new species of seaweed, they attracted others of their kind and in the general excitement five or six otters were often caught in one net. At such times every one was for himself and a general fight took place. The infuriated otters would bite each other and the wooden floats on the nets and within a few hours all, or nearly all, were drowned.

The habits of the sea otter are extremely interesting. This animal always swims on its back with head turned upward. Consequently it swims backward, always, however, keeping an eye in the direction toward which it is going. When it is about to dive the otter turns over and goes under back up and remains so while under water, but immediately resumes the opposite position on reaching the surface. While under water, if not too far from the boat, the otter can be easily distinguished because it assumes a golden color and looks somewhat like a sailor in an oil-skin jacket, although in fact it is a deep black or dark brown.

The young of the otter are born, as far as I could ascertain, in the spring, and there is but one young per year. The mother is devoted to her offspring. She holds it in her arms and fondles and caresses it, and when danger approaches she risks her own life to protect it. At such times she at once makes off, sometimes swimming, but oftener

diving at short intervals, for she well knows that if she remains too long beneath the water the young will perish. Each time the surface is reached the little fellow utters a loud cry, and this at once attracts the attention of the hunter. To deaden the outcry the mother will often duck the head of her offspring beneath the water repeatedly. When the weather is foggy the only otter that can be chased with any degree of success is the mother with her baby, whose cries betray her.

In the early days of my hunting on the Japan coast we found the otters in their primitive state because they had never been hunted at sea. There we found them in "schools" and as many as 400 were sometimes seen in one school. Often just a family would be together—a father, mother, young of the previous year, and the baby. These when pursued would usually still band together, and the whole family would then be destroyed by the merciless bullets of the hunter. In Alaska, where the hunting had been carried on for years, the mother would often desert her young even before a shot was fired. The baby thus deserted, if only a few weeks old, would drown, but if two months old he could take good care of himself, for he can then dive from thirty to forty yards.

The food of the sea otter consists largely of sea urchins, for which the otter dives to the bottom. He comes to the surface with the food, places it on the breast, where it is torn in halves; the contents are taken from each half and the shells are tossed often to a considerable distance. The otter then washes and cleans his face and "hands" before diving for more food. Otters also eat seaweed and fish, but probably not much of the latter, with the exception of the squid, upon which they are obliged to subsist when driven far out to sea by constant hunting. They are unable to reach bottom when the water is much over sixty fathoms.

That sea otters eat codfish is in a measure proven by the following interesting incident: Our schooner was anchored about twenty miles from land in sixty fathoms of water. Codfish were abundant, and one man was fishing while a number looked on. The weather was extremely foggy, and presently a sea otter, drifting by and apparently mistaking the schooner for a rock, swam towards it. Rifles were at once secured, but in the mean time the otter had dived and was apparently lost. Presently, however, the fisherman got a bite, and after hauling in the fish for a considerable distance, was suddenly surprised to find the strain on his line greatly increased. We were all curious to see what he had hooked and found an otter clasping the codfish in his paws. A bullet soon ended his career.

The sea otter displays much common sense and sometimes remarkable strategy. Its greatest enemy other than man is probably the killer whale. This animal destroys great numbers of fur seal, which it finds easy prey. In the excitement of pursuit the seal makes a great commotion by leaping out of the water. This attracts the whale and the seals are soon dispatched. The sea otter likewise makes off instantly from this enemy, but if he finds that he has not evaded his pursuer he knows that flight is useless; he then doubles up as if dead and remains motionless. The whale does not eat carrion, and thinking this to be such, he passes on to locate the living otter that has seemingly escaped.

The natives formerly hunted the otter with skin canoes and used spears instead of guns. These they could throw with great accuracy

and for considerable distances. After the animal had received several spears in his body he was unable to dive and was soon dispatched with a long club. Each native had a private mark on his spear point and when the otter was killed the native who had struck his spear nearest to the otter's head claimed the skin. When muzzle-loading guns were used many otters escaped after being struck, for the bullets would sometimes barely penetrate the skin. I myself took several such bullets from otters which I secured and undoubtedly they had carried them beneath their jackets for many years, for such rifles had gone out of use before I lived in Alaska.

Only a few otters are now taken in Alaska, and I know of none taken about the Kuril Islands. Stringent laws have been passed to protect any that may be left along the California coast. We may hope, therefore, that this, the rarest and most beautiful of all fur-bearing animals, in time may be able to re-establish itself to such a degree that future generations may reap some benefit from its presence along our shores.

CALIFORNIA'S PREHISTORIC GAME.

By HAROLD C. BRYANT.

A visit to the Museum of History, Science and Art in Los Angeles impresses us with the marvelous forms of animal life in prehistoric times. Imagine yourself in a region in which the elephant, mastodon and ground sloth tracked the wilds. Think of the exciting sport of hunting the saber-toothed tiger, cave bear, wolf and other carnivores once so abundant in this State.

Authentic evidence of the occurrence of these forms is furnished by recent finds in the oil fields, which have proven a great storehouse for prehistoric fauna of this State. Complete skeletons of all of the above mammals have been dug from the asphaltum of Rancho La Brea, near Los Angeles. Bones are piled thirty or more feet high and there seems to be no end to new discoveries. The teeth of the animals have been wonderfully preserved and in many instances not a bone is found broken.

We are led to conjecture why these many forms of life are now extinct; they were evidently not exterminated at the hands of man, and yet they are gone from the earth as completely as are those species which owe their extinction to the invention of firearms. The ebb and flow of life on the earth form an enigma which all our years of research and study have but slightly cleared up. This fact should drive us to work the harder to decipher some of the laws which govern animal life.

Nor should a knowledge that many forms of life have become extinct from natural causes lead us to think that living species are doomed to extinction and that the toll taken by man can make but little difference; for whereas, under natural conditions, the death of a species may have taken thousands of years, man is able to exterminate them entirely in fifty. Hence, we should remember that man is drawing upon the supply of wild life faster than the reservoir can be filled. The lifetime of a species is governed by a higher power than our own, and if we accelerate by artificial means the forces leading toward extinction, future generations will suffer for our thoughtlessness.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

April 15, 1916.

FOREST SERVICE CO-OPERATION.

A NEW department in CALIFORNIA FISH AND GAME entitled "United States Forest Service Co-operation," starts with this issue. Co-operation, such as exists between the Fish and Game Com-

mission and the United States Forest Service, is almost inevitable. Both forces are working for conservation of natural resources and these resources are mutually dependent. Forest Service rangers are deputies of the California Fish and Game Commission and have been a potent force in educating the public to the need and value of game conservation, as well as in

COMMISSION FEEDS DEER AND QUAIL.

The unprecedented snowstorms in the northern and mountain districts brought to light many interesting things in connection with our birds and animals and no doubt proved very enlightening. One of the things demonstrated was that the nonpredatory birds and animals nearly always seek aid from humans when hungry or in distress. Large numbers of deer, quail, and other birds came to ranches



Fig. 26. Wild deer feeding in barnyard on ranch of A. K. Lea, Cloverdale, Sonoma County, California, September, 1915. Photograph by Mrs. A. K. Lea.

where domestic stock were fed. They also came to the edge of many towns as though looking for aid from the residents (see Fig. 27). The extreme conditions demonstrated that deer are much more numerous in northern California than was believed. Our private correspondence and reports from deputies tell of large bands of deer seen in Eldorado, Shasta, Lassen,

Modoc and Siskiyou counties. They tell of bands of deer being fed by cattlemen and farmers. All are authentic. For instance, it is reported that Mr. A. C. Sprout, of the California and Oregon Power Company at Opeo, on the Klamath River, has fed approximately 300 deer.

Many residents of the northern counties undertook the work of voluntary feeding of game without any expectation of payment or reward, and although Mr. Newbert acted promptly in the matter, backed up by the Board of Control in allowing our estimate for the purchase of feed, it was owing to the prompt action of the residents in the different sections which our deputies could not reach and which were cut off from communication by mail, that enormous numbers of deer and quail were saved. The Sacramento office has written a large number of personal letters to individuals and newspapers thanking them for their co-operation and kindness shown during the trying period.—GEORGE NEALE.

PARCEL POST SHIPMENTS OF GAME.

The Fish and Game Commission has been making such a strenuous fight against the market hunters who ship their game to the San Francisco markets by express, that it has become exceedingly dangerous for the shippers to send illegally shipped birds by that method; the chances of having them confiscated are too many. Some of the hunters for a time resorted to the mails, sending birds by parcel post, knowing that the deputies of the Commission did not have the same opportunity to inspect postal shipments as they did express.

Investigation showed that according to the California law, all game offered for shipment must be at all times in open view. The postal regulations provide that game must be carefully wrapped in order to prevent damage to other mail matter. But the United States regulations also provide that all game offered for shipment must be strictly in accord with all of the provisions of the state laws.

How these conflicting provisions have been brought into accord is explained by

the following letter received from the post office department at Washington:

WASHINGTON, D. C., January 28, 1916.
FISH AND GAME COMMISSION,
Mills Building,
San Francisco, California.

GENTLEMEN: Receipt is acknowledged of your communication of the 17th instant advising this office that

"Section 627b of the Penal Code of the State of California provides that game offered for shipment or transportation must be at all times in open view."

In reply I have to say that the Act of Congress of March 4, 1909, 35 Stat. 1137, embodied in section 477a, Postal Laws and Regulations, a copy of which is enclosed, prohibits the shipment of dead bodies, or parts thereof, of any game animals or birds killed or offered for shipment in violation of the laws of the state, territory or district in which killed or offered for shipment, and since the laws of the State of California do not permit the shipment of the dead bodies of animals or birds when wrapped, postmasters in that State must, of course, govern themselves accordingly. The dead bodies of wild animals or birds may be accepted for transmission in the mails only when wrapped so as to prevent injury to other mail, and it is not practicable to handle shipments of such matter by parcel post in the manner required by the California laws.

Respectfully,

[Signed]

A. M. DOCKERY,
Third Assistant Postmaster General.

OREGON PROTECTS FUR-BEARING MAMMALS.

Oregon in 1913 established a trapper's license law which requires every trapper who traps anywhere except on his own property, to procure a license costing one dollar. The fur-bearing mammals protected are the otter, mink, fisher, marten, and musk-rat. The open season is from November 1 to February 28. The flesh of game birds or mammals is prohibited as bait for traps. As a return to the trapper for his license fee the Fish and Game Commission is carrying on investigations which are of help to the trapper and is also accumulating data as to the number of fur-bearing mammals taken each year. The latter information is obtained by requiring each trapper to make a full report as to the fur-bearing mammals caught and killed during the open season. Despite the fact that certain raiders of the poultry yard are given protection as fur-bearers, the proviso that nothing shall prevent any person from

protecting his own premises from the depredations of fur-bearing animals appears to have secured popularity for this law. The State Biologist of Oregon recently stated that there is no opposition to this law by trappers, because they themselves advocated its adoption.

Each trapper now feels he has an equal chance at the fur-bearers, for summer trapping by the amateur has been abolished.

A law such as this should be considered for this State. California is wasting a valuable resource by a faulty administration of her fur-bearing mammals. The black bear, mink, river otter, fisher, and red fox are among the fur-bearers which should be protected during the summer months when the fur is of no value; and a policy which will allow of a checking up of this resource will help save it as a source of recreation and profit for the State.

ADMINISTRATIVE CHANGES.

At a meeting of the Board of Fish and Game Commissioners held January 15, 1916, the Fresno Division of the Commission was abolished. Mr. A. D. Ferguson, who has for many years been in charge of this division, was appointed Field Agent of the Commission, his duty now being the supervision of the field work of the deputies.

The State Board of Control has sanctioned the abolishment of the State Game Farm at Hayward. It has not been determined how soon the farm can be abandoned, owing to difficulties over the lease now held by the Commission.

NOTES FROM THE LOS ANGELES DISTRICT.

Southern California had the longest quail season in 1915 that has been enjoyed in years—two and one-half months. Shooting was good at the end and the best stock of breeding material left over that has been spared in many seasons, notwithstanding the two-and-a-half times as much hammering given to the quail here.

If any proof was needed that the past was an exceptionally good shooting season in southern California, it could be obtained from the sporting goods stores, which report a remarkable increase in the demand for small-gauge shotguns. There has been a steadily growing movement

toward the use of less shot for game shooting as the limits went down, harmonious with the desire to do the limit thing in a little more difficult manner, so as to get in a larger satisfaction in bagging the few birds allowed. Hence, dealers in southern California are ordering hardly any 12-bore guns at all, except for trap shooting. All are going to the "sixteens" and "twenties." Some even take up "twenty-eights." This is all as it should be. The small-bore double gun is the modern sportsman's arm, and goes hand in hand with the reduced bag limit.

Southern division field patrolmen under Commissioner Connell's direction have paid particular attention to the along shore sea fisheries since the game season closed, and have made several good cases.

Deputy Becker has made it a rule to carry license books with him in the field, so as to supply any applicants in good faith with licenses. The State gets 100 per cent of such license collections, no commission being paid to salaried deputies.

E. HEDDERLY.

COLD WEATHER AND GAME.

The heavy snows of the past winter have, without doubt, made it difficult for many of the game species to obtain sufficient food. However, the newspaper reports to the effect that hundreds of deer and thousands of quail were dying of starvation in the mountain districts were in many cases greatly exaggerated. When some of the instances cited by newspapers were investigated, it was found that someone, either as a joke, or with malicious intent, started the rumor. In one particular instance investigation showed that the man who was quoted as saying that miners near Barden had been feeding over seven hundred quail and giving their last stock of oatmeal for this purpose, had not been anywhere near the place described and had simply invented the story. The report appearing in the CHICO RECORD that over a hundred deer were dying from starvation in the Butte Creek country was also found to be without foundation.

A report of the killing by predatory animals of large numbers of deer, weakened by starvation, was recently furnished a forest ranger by an inhabitant of the northern part of the Eldorado forest and later appeared in a Placerville newspaper. Investigation of the ground



Fig. 27. Valley quail being fed during January snow storm by Superintendent of Streets Edgar Thomas at Yreka, Siskiyou County, California.

for the report brought a letter from the forest supervisor, of which the following is an extract:

The information contained in the newspaper clipping was furnished one of the Eldorado forest rangers by Mr. Zoover, who resides the greater portion of the year in the northern part of the Eldorado Forest. I am not in position to vouch for the truth of his information. We have not received reports from other portions of the forest of deer having been killed by predatory animals. Mr. Zoover lives in an isolated portion of the forest in which there are no roads. Snow has fallen this winter to an unusual depth, and in all probability Mr. Zoover has greatly exaggerated facts, since he is well aware that forest officers have no work to perform in his locality during the winter months.

Additional information has strengthened this viewpoint. Hence, we are led to believe that in this case, also, exaggerated statements were made.

That the cold weather of the past winter was to some extent destructive to both deer and quail is, however, not to be denied. A few instances to this effect are here cited.

According to Deputy E. H. Ober, Inyo County has experienced an unusually severe winter. During January eleven feet of snow fell. He reports: "I covered over

125 miles on my skis and web snowshoes, scattering feed and digging trenches for quail. I found the quail dead everywhere along the foothills. With deep snow covering the ground they seemed to have no way of getting food. A few birds got to the valley, but many were caught high up on the mountains. One small covey about three miles west of Big Pine, which I fed regularly, had in it, when I started feeding, thirty-five birds, but when I last saw them only twenty-five were left. We will probably lose about 85 per cent of our wonderful supply of mountain quail. We had more than 800 deer in our valley in herds ranging from 6 to 190. I saw a herd of 206 one day. We lost a few deer, but none to speak of."

Deputy L. J. Warren, of Taylorsville, Plumas County, reports that the severe weather in his district resulted in the destruction of many quail. He estimates the loss at about 20 per cent for the entire winter. The statement is also made that hawks and predatory mammals seem to take an especially large toll when the birds are snow-bound. During a storm Mr. Warren had 126 deer under daily observation. The loss was four.



Fig. 28. Severe weather in the Sierras. Note how completely the natural food supply of game has been cut off by the deep snow.

VALUABLE INFORMATION ON FISH AND GAME.

Through the co-operation of the United States Forest Service, valuable data as to the status of fish and game within the State are made available. Forest rangers are in a particularly favorable position to obtain information as to the game species found in the national forests and as to their condition at the present time. A circular letter asking for information on beavers, grouse, sage hens, and introduced game birds has brought information which could not otherwise have been obtained. The reports regarding beavers show that this valuable fur-bearing mammal is still to be found in many parts of the State, and that the protection now afforded it will, perhaps, be instrumental in allowing an increase in numbers. A map is being prepared to show the location of the various colonies within the State, and a full report as to the status of the beaver in California will soon be issued. The data obtained through the Forest Service is reliable and comprehensive and is invaluable in showing the adequacy of the present policy in relation to the administration of game resources and in pointing the way for the future.

JOHN X. DE WITT.

With sincere regret we record the death in San Francisco on January 7, 1916, of John X. DeWitt, sportsman and writer on fish and game. For several years prior to his death, Mr. DeWitt was editor of the sporting department of *BREEDER AND SPORTSMAN* and contributor to various San Francisco newspapers. His intense love of hunting and of the out-of-doors lured him to the open fields and to the swift flowing streams. Here his keen observation disclosed to him the secrets of the wild things of the open. This knowledge and his power of building words into beautiful pictures made what he had to contribute vital and worth while. To his love for the out-of-doors was added a love for his fellow man, which made all who knew him his friends.—J. S. H.

A HEARING AT SANTA ROSA.

Following the arrest of a Santa Rosa sportsman for capturing a steelhead trout by means of a grab-hook, considerable interest was developed in that city as to how trout may be distinguished from salmon. Many of the residents of Sonoma

County call the steelhead trout which runs in the Russian River, a salmon. In order that there might be a better understanding of the state fish laws, Mr. Walter Nagle, secretary of the Santa Rosa Chamber of Commerce, arranged a hearing at the courthouse. Dr. H. C. Bryant and Mr. N. B. Scofield represented the Fish and Game Commission. Over fifty men were present at the meeting and all showed interest in the proceedings (see

Dr. Bryant, who acted as chairman of the meeting, called attention to the educational work of the California Fish and Game Commission and made a plea for better co-operation in the enforcement of fish and game laws. Mr. Scofield then pointed out the differences between trout and salmon and suggested methods whereby these fish could be better conserved. When the meeting was thrown open a lively discussion took place as to whether



Fig. 29. Sixty men interested in the salmon and trout laws attended a hearing at Santa Rosa on February 9, 1916.

Figs. 29 and 30). Specimens of a steelhead trout and a quinnat salmon were on exhibition, and the distinguishing features of each were pointed out. The main points of difference given were as follows:

Trout.

1. *Habits.* Remains in fresh water until 2 or 3 years old; then goes to sea; returns to spawn year after year, developing more than one batch of milt and roe.
2. Skeleton hard.
3. Anal fin square, with tip reaching beyond base; contains 12 or less rays.
4. Teeth present in middle of roof of mouth.
5. More slender in shape.

Salmon.

1. *Habits.* Goes to sea first year, where it remains from 3 to 4 years; then goes into fresh water to spawn, dying immediately thereafter. Only one batch of milt and roe.
2. Skeleton soft and porous.
3. Tip of anal fin not reaching to base; 14 or more rays.
4. No teeth in middle of roof of mouth.
5. Less slender in shape.

salmon and trout should be taken with other than a spear or hook and line in the manner commonly known as angling. A vote taken showed those present in favor of the use of a gaff-hook as well as a spear. It was also voted that it be the sense of the meeting that "one" be made the limit for salmon and steelhead trout during the winter open season in district 2.

Such hearings as this not only stimulate interest in fish and game resources but have the added value of bringing to the Fish and Game Commission valuable suggestions as to needed laws. In the future, hearings of the same sort will be held in other parts of the State in order that mooted questions regarding fish and game and the laws protecting them may be settled.

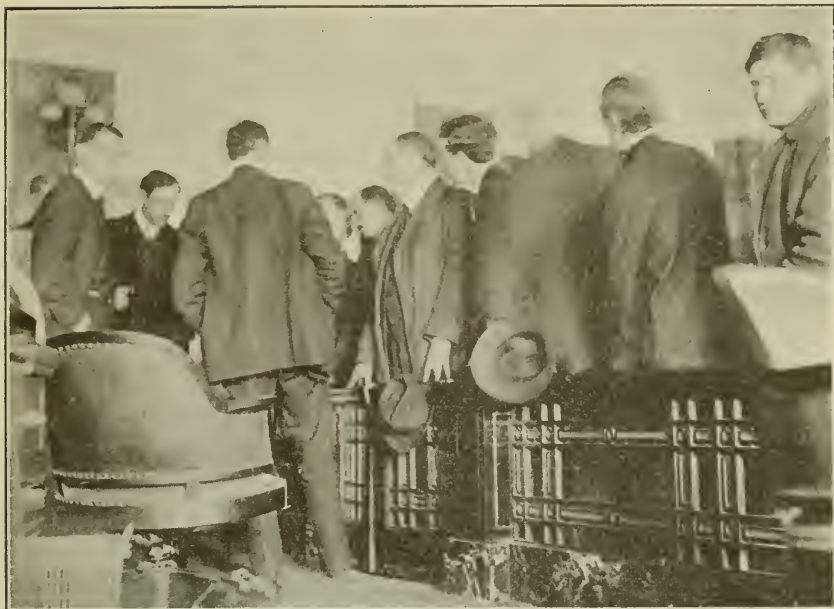


Fig. 30. Interested individuals at the hearing at Santa Rosa, examining specimens of salmon and trout

GAME LAWS VS. KNOWLEDGE.

While the penalties of the law, no doubt, are effective in restraining a great many in the killing of game out of season, or in exceeding the limit of kill during a given period, the one thing which will offer sure protection is the growth of knowledge and the development of a sense of honor and justice in relation to the protection of game.

The man who goes out and wantonly slaughters game for the love of killing needs a good strong penalty and is richly deserving of it, if such penalty overtakes him. That man needs understanding and a sense of honor which education of some sort can alone bring to him.—
BAKERSFIELD CALIFORNIAN, September 14, 1914.

SONG-BIRDS ARE KILLED.

A number of flagrant violations of the law protecting the song-birds of the State have taken place this past winter. Convictions have been obtained in practically every case. Between December 1 and March 1, sixty-five arrests were made and \$793.50 in fines imposed. A large proportion of the hunters arrested were Italians who had been shooting robins. The accompanying photographs (Figs. 32

and 33) show birds confiscated. Forty-eight robins, a red-shafted flicker, and a California towhee were taken from two men who had been hunting in Contra Costa County, and twenty-eight robins, ready to be roasted, were confiscated from two men in Sacramento.

ATTEMPT TO ABOLISH KLAMATH LAKE BIRD RESERVATION.

The following letter from T. S. Palmer, in charge of game preservation, United States Biological Survey, explains the present status of the Klamath Lake Bird Reservation:

In reply to your letter of December 30th regarding the Klamath Lake Bird Reservation, I beg to say that last year the boundaries of the reserve were modified so as to eliminate certain lands in the southeastern part of the reserve which were desired for settlement and which were not especially needed for purposes of the reservation. This change in the boundary eliminated all private holdings and all lands on which any claims had been filed, with one or two exceptions. Recently a movement has been set on foot to secure the elimination of certain other lands and if possible to abolish the reservation. A bill for this purpose (H. R. 3578) "Restoring to the public domain certain lands heretofore reserved for a bird reservation in Siskiyou County, California, and Klamath County, Oregon," was introduced on December 10, 1915, and is now in the House Committee on Public Lands. So far as I am aware, the bill has not yet been acted on by the committee.

BREEDING DUCKS FOR SPORT.

One of the first attempts in California to breed ducks for sport has been carried on during the past season. Mr. Charles Shaw established last year on the Briggs Ranch near Newark a miniature game farm. In May, 1915, he received a shipment of 100 black ducks' eggs from Connecticut. These were hatched in incubators and about 85 birds reared to maturity. A number of mallard eggs were

GOLDEN BEAVERS TO BE DRIVEN FROM HOMES.

Mandeville Island, situated between Middle and Old rivers, on the lower San Joaquin, will be reclaimed this spring. Mr. Geo. Shima, the "potato king," has secured the property and will put it into potatoes. Since this island has long been the home of several colonies of golden beavers (*Castor subauratus*) this bit of news is of particular interest. The first

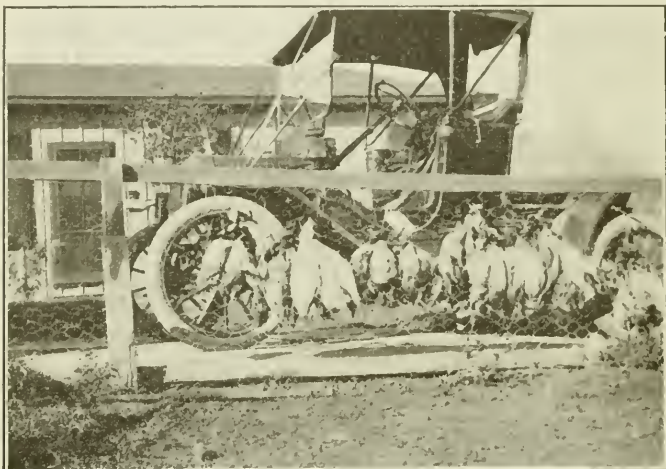


Fig. 31. Sixty ducks (more than a limit) seized from a market hunter at San Diego, California, by Deputy Webb Toms, direct evidence that there are still violators of the limit law.

also secured from the East and these were also hatched and reared. The experiment apparently proved very successful. Many native birds were attracted to the preserve by those reared, and the facilities for hunting were greatly increased. In addition the grounds were made attractive to ducks by the planting of certain well-known duck foods, imported from the East.

This experiment is of particular interest for two reasons: the introduction of food plants attractive to wild ducks will demonstrate what can be done toward furnishing a better food supply to wild fowl, and the successful rearing of wild ducks for sport will demonstrate whether or not this will prove profitable under our conditions.

For many years past the preserves of Great Britain have reared thousands of wild fowl and used them to augment shooting, but little has been done in this direction in the United States.

step in this reclamation project will be the draining of the land and burning of the tules and undergrowth. Those beavers which escape the flames will be driven elsewhere. It is natural to expect, therefore, that there will be additional damage to levees due to the building of new burrows and that there will follow a reduction in numbers of this valuable furbearer.

This instance emphasizes the often cited fact that in the reclamation of land we have one of the strongest factors tending toward the extermination of wild life. To find a solution for a problem such as this is extremely difficult. A tract of land set aside as a refuge where beaver might breed unmolested appears to offer a practical solution until methods of capture and transportation are considered when such a project immediately appears less feasible. In fact, a study of the problem tends to emphasize the hopeless-

ness of the situation. The dollar looms large alongside of sentiment in favor of protecting wild life. So long as this viewpoint is paramount in the minds of the public the cause of wild life conservation will suffer. When sentiment comes more to the front as it did when the effort was made to save Yosemite Valley and Niagara Falls, even such obstacles as the one outlined above will be overcome.

CHILDREN TAUGHT TO RECOGNIZE BIRDS.

Mr. William Leon Dawson, the well-known bird man of Santa Barbara, has stimulated interest in the bird life of that city by holding a contest open to children

ing about proper conservation. It is difficult to convince the game law violator of the error of his ways, but if children are properly trained our wild life in the future will be conserved without the necessity of numerous and drastic game laws.

WHO IS RESPONSIBLE?

A correspondent suggests that, although the decrease in quail and grouse is usually attributed to sheep, that the tourist's gun is the most deadly enemy of these birds. We wonder whether he is not perhaps on the right track. Is it not quite possible that the gunner is attempting to shift a responsibility which really rests upon himself?



Fig. 32. Forty-eight robins, one red-shafted flicker and one California towhee confiscated from two Italian hunters.

in the public schools from the ages of twelve to eighteen. Prizes were offered to the pupil who could identify the largest number of birds in the field. The actual test was made on a field trip upon which certain winners were taken and asked to identify the birds seen. The first prize of \$15.00 was awarded Mr. Robert Hyde, who successfully identified 18 birds. The second and third prizes of \$7.50 and \$2.50 were won by Robert Canterbury and Arthur Wyman.

Similar contests should be held in every city in the State. The interest of children in wild life is fundamental in bring-

CEMETERIES AS BIRD SANCTUARIES.

The National Association of Audubon Societies is actively pushing the project of making bird sanctuaries of all the cemeteries in the United States. Should this campaign be completely successful, more than a million acres would be added to the total area on which bird life is protected.

It is interesting to note that one of the first laws protecting song-birds in California set aside public cemeteries or burying grounds as game refuges, prohibiting the destruction of both birds and nests and eggs. This law was enacted in 1872.

GAME WARDENS AND AUTOMOBILES.

Under a new ruling by the State Board of Control deputies of the Fish and Game Commission who own automobiles are to receive a flat rate of $4\frac{1}{2}$ cents per mile while the automobiles are being used in the service of the State. Heretofore deputies have been reimbursed for gasoline and minor repairs. The State recognizes the increased efficiency of the deputy who uses an automobile and this new ruling, although perhaps not as liberal as it should be, is a step in the right direction.

feet in area, and dens, which afford sleeping quarters and shelter. The runways are variously constructed, and may be of 1-inch mesh, no. 14 wire, of galvanized poultry netting, of galvanized sheet iron, or of smooth boards set on end. When netting is used, it covers top, bottom, and sides. Board or sheet-iron walls extend 2 feet into the ground and turn inward a foot at the bottom. Covered runways need not be more than a foot high. Those open at the top are built 4 feet higher than the maximum fall of snow.

Dens are usually built of boards and



Fig. 33. Twenty-eight western robins "spitted" ready for roasting, confiscated from two Italians in Sacramento.

DOMESTICATING MINKS.

One of the first American fur-bearers to be tested as to its fitness for domestication was the mink, an animal which has long been renowned for the beauty and durability of its fur. It is found wild throughout Canada, Alaska, and all but the arid southwestern portion of the United States. The mink has been bred in confinement, sporadically, for upward of fifty years; but only recently, since it has become quite scarce in the wild state and the value of its pelt correspondingly increased, has a general and systematic attempt been made to add it to our stock of domestic animals.

Inclosures for minks include runways, which need not exceed 16 or 20 square

set a little above the ground to keep them free from moisture. They are about 3 feet long, 1 foot wide, and 1 foot high at the eaves, the roof being sloping and covered with water-proof material. Each box has a cross partition a foot from one end, making a small compartment for the nest, and a large one for an entry, shelter, and feeding place. The entrance, at the end opposite the nest, is 4 inches in diameter and has a slide door by which the tenant may be shut in or out. The roof or lid is hinged at the higher edge, and there is a removable screen just below it to prevent escape when the lid is raised. Leaves, dry grass, or straw are used for bedding.—*U. S. Dept. of Agric. Weekly News Letter*, February 16, 1916.

1915-16 DUCK SEASON POOREST IN YEARS.

Deputy W. H. Armstrong, of Vallejo, reports as follows: "I have hunted and shot ducks on the marshes and sloughs of this district since I was twelve years old, but am convinced that the duck season which closes in a few days, has been the poorest season I have ever seen." Everyone in northern California seems to be unanimous in the belief that the last duck season was far below normal. The explanation generally given is that the unusual weather caused the birds to go farther south and hence fewer remained in northern and central California. We have no exact evidence in this regard, except that southern California had good shooting. Thus it would appear that this may have been simply an "off season" and that birds are not in reality as few in numbers as indicated by the birds present during the open season.

Although this year's shooting has been poor, the abundant rainfall during this past winter is sure to cause many ducks, which as a rule leave the State during the spring migration, to remain here and breed.

THE EFFECT OF THE WAR ON BIRDS.

Such reports as have been received thus far indicate that the war will have comparatively little effect on birds. A few storks, owls, swallows, and other birds that nest about buildings, having found the accustomed home destroyed, have sought other quarters; and game birds in France have displayed an unwonted tameness, owing to omission of the usual hunting; but a vast majority of wild birds have followed their ordinary habits, regardless of changed conditions. Woods daily riddled with bullets resound with the songs of nightingales, thrushes, and blackbirds; after fierce night engagements, in which artillery and infantry have taken heavy toll of human life, at dawn the usual peaceful chorus has been heard floating over the corpse-strewn battlefield; pheasants and partridges have been seen strutting unconcernedly about an orchard situated directly between the opposing lines and often swept by rifle

and artillery fire; and the song of a soaring skylark has been heard in a moment's cessation of the thunder of cannonading. As fearful as the war seems to us, to the birds it brings no greater cause for anxiety and terror than the constant war they endure at the hands of man in our times of peace. Rather have they shown less fear than ordinarily, nesting in trenches among the soldiers and even feeding from the hands of their late enemies.

Many instances have been reported of birds giving warning of the approach of zeppelins or aeroplanes; soldiers have been awakened and informed of a coming attack of poisonous gas by the noise of birds which have detected the fumes; and once, in the North Sea, the presence of a submarine was disclosed by the clustering of gulls around the periscope. Parrots have displayed special susceptibility, showing great excitement and screaming loudly before the attacking aeroplanes were discernible by human vision, and a number of these birds are said to have been placed on the Eiffel Tower, in Paris, to ascertain how useful they may be in announcing the approach of hostile aircraft.—*Current Items of Interest*, November 15, 1915.

HUNTING ACCIDENTS.

A partial list of the accidents incident to the last open season is appended herewith. In almost every instance where death followed, a man was mistaken for a deer. Evidently the "look before you shoot" motto is still disregarded by many hunters, for since our law allows only the killing of deer with well-developed horns, there is no excuse for the man who makes a mistake as to his mark.

A perusal of this list does not bring out as it should the tragedy and heartache which followed the carelessness of the hunter. Nevertheless, it is hoped that it will suffice to bring to the mind of every reader the conviction that unless greater care is exercised in the use of firearms, there will be a need for the institution of shooting laws more largely as a protection for man than as a protection for game itself.

HUNTING ACCIDENTS

KILLED

| <i>Name</i> | <i>Shot by</i> | <i>Date</i> | <i>Locality</i> | <i>How shot</i> |
|--------------------|------------------------------|-------------------|----------------------------|----------------------------------|
| Dr. J. F. Richards | Companion | ----- | Contra Costa Co. | Hunting quail |
| John England | M. J. Kennedy | August, 1915 | Annapolis, Sonoma Co. | Mistaken for deer |
| James Hoover | W. C. Hoover (brother) | August 22, 1915 | Beswick, Siskiyou Co. | Mistaken for deer |
| Ellis Dawson | Will George (brother-in-law) | August 24, 1915 | Cecilville, Siskiyou Co. | Mistaken for bear |
| Frank Adams | Jack Stambo | November 28, 1915 | Eagleville, Modoc Co. | Mistaken for hawk |
| Albert S. Bacon | Theodore Haskonson | October, 1915 | Bee Gum, Tehama Co. | Mistaken for deer |
| John Crank, Jr. | Two hunting companions | October 11, 1915 | Weaverville, Trinity Co. | Mistaken for deer |
| Wm. Dornan | Alexander Scappizzi | August 29, 1915 | Electra, Calaveras Co. | Mistaken for deer |
| WOUNDED | | | | |
| Drury J. Edds | Party of four hunters | August 23, 1915 | Baird, Shasta Co. | Mistaken for bear |
| Mr. Collins | Companion | October, 1915 | Elsinore, Riverside Co. | Shot in eye while quail hunting |
| A. L. Porter | Uede Jacobs | November 19, 1915 | Elsinore, Riverside Co. | Shot in eye while quail hunting |
| Theo. Gutman | Fred Schneider | September 9, 1915 | Elsinore, Riverside Co. | Shot in eye while rabbit hunting |
| Chas. Dundas | R. C. Pridge | October 25, 1915 | Elsinore, Riverside Co. | Shot in eye while quail hunting |
| Vincent Gregory | ----- | November 15, 1915 | Elsinore, Riverside Co. | Shot in arm while duck hunting |
| Percy Lee | G. F. Marshall | August 15, 1915 | Placerville, El Dorado Co. | Mistaken for deer |
| W. C. Jarete | Herbert Taylor | August 15, 1915 | Stockton, San Joaquin Co. | Hunting deer |
| W. Y. Stoddard | Paul Sprague | October 16, 1915 | Quincy, Plumas Co. | Hunting ducks |

SHOT BY ACCIDENTALLY DISCHARGED GUN.

| <i>Name</i> | <i>Locality</i> | <i>How shot</i> |
|-------------------|------------------------------|---|
| Albert Richardson | Placerville, El Dorado Co. | Shot in left hand by accidental discharge of gun held by Frank Deely while deer hunting |
| Joseph Costa | Benicia, Solano Co. | Shot in leg by gun held by brother, discharged when crawling through fence |
| Antone Crava | Rio Vista, Solano Co. | Shot through heart by accidentally discharged gun being removed from boat |
| Jos. Cantria | Encinitas, San Diego Co. | Shot while pulling gun through fence |
| Roy Flag | El Cajon, San Diego Co. | |
| Amos Decker | National City, San Diego Co. | Shot while pulling gun through fence |
| Jess Businell | Monterey, Monterey Co. | Tripped over gun while duck hunting |

REAPPEARANCE OF QUAIL DISEASE.

Owing to the prevalence of quail disease among quail imported from Mexico at the ports of New York and Eagle Pass, Texas, during the past month, the Department of Agriculture has suspended issue of further permits for entry of these birds this season. Quail in shipments actually en route to the United States on January 20, will be admitted to quarantine, but no further entries will be authorized.

Most of the states now have such stringent game laws that it is practically impossible to purchase quail even for propagating purposes in the United States and dealers have sought quail elsewhere, especially in northeastern Mexico, where quail occur in abundance, but Mexican quail on arrival at destination are frequently found infected with quail disease. So fatal is this disease that when it once appears most of the birds which are exposed to it die within a few days. In one shipment of 196 quail which recently reached New York only three birds survived the voyage, and in another of about 160 birds, more than two-thirds of the number died shortly after arrival. More than one-third of all the Mexican quail imported last year died within a few months. To guard against spread of quail disease live quail purchased for propagation should be kept under observation for two or three weeks and should not be liberated if infected with disease. The Department desires to ascertain the result of experiments which have been made in importing quail this year and will be glad to receive information as to the condition of the birds and as to how many have died in any locality where the quail have been introduced.

Before next season the Department will hold a public hearing in Washington, D. C., for the purpose of determining whether or not further permits for importation of quail from Mexico will be issued, at which various questions connected with the importation of quail will be carefully considered. Ample notice of this hearing will be given later in order that those who are interested may arrange to be present or to submit written statements.

A MIXED RATION FOR PHEASANTS.

Two ring-necked pheasants (a cock and a hen) confined in a pen 8' x 16' x 6' and

rat-proof, sides and top of 1" mesh galvanized wire, were recently tested as to their food preference. Food was accessible to them at all times but in separate hoppers, which were covered with wire to prevent waste. All food materials were carefully weighed on a kitchen scale. My purpose in making the test was to establish the food preference of the birds.

For convenience of comparison I have tabulated the results as follows:

| | Ounces | Per cent |
|---------------------------|--------|----------|
| Cracked wheat ----- | 36 | 20 |
| Cracked corn ----- | 41.4 | 23 |
| Rolled oats ----- | 12.6 | 7 |
| Rape seed ----- | 21.6 | 12 |
| Millet seed ----- | 14.4 | 8 |
| Canary seed ----- | 12.6 | 7 |
| Ground dried meat ----- | 34.2 | 19 |
| Granulated charcoal ----- | 1.8 | 1 |
| Grit ----- | 1.8 | 1 |
| Ground bone ----- | 1.8 | 1 |
| Calcined shell ----- | 1.8 | 1 |
| | 180.0 | 100 |

In addition, the birds were supplied with a head of fresh lettuce per day, of which they consumed from one-half to three-quarters. It will be seen that the food taken averaged 2½ ounces each per day.

At the commencement of the test the cock weighed 1 pound 14 ounces and the hen 1 pound 8 ounces; at the end of thirty days, when the test was completed, the cock weighed 2 pounds 4 ounces, a gain of 8 ounces, whereas the hen weighed 1 pound 12 ounces, or a gain of 4 ounces. This gain in weight indicated that these pheasants had thrived upon the mixed food afforded them.—JOSEPH KETCHUM.

1917 NATIONAL SPORTSMEN'S SHOW.

The National Sportsmen's Show Corporation of No. 1 Madison Ave., New York City, will hold the next annual Sportsmen's Show under the auspices of the National Sportsmen's Association, Inc., in February, 1917, in New York City. A strong array of exhibitors is already lined up and includes a number of new comers in the field, besides some of the old stagers who exhibited in the earlier shows but fell out of line and now have volunteered to enlist again in the ranks. As it is obvious that there are probably now at least one hundred sportsmen and outers in North America where there was one in 1895, when Captain J. A. H. Dressel put on and managed the first Sportsmen's Show in the Madison Square Garden, the belief is warranted that the shows of the future

can be greater and meet with a fuller response than those successfully managed by Captain Dressel from 1895 to 1910, inclusive.

The next and future Sportsmen's Shows will be managed by Captain Dressel and Mr. Allen S. Williams. While there is to be novelty in the treatment of the great theme of outdoor life, the purpose will be maintained to revive the old Sportsmen's Show as it was in its palmiest days and make it as much better as experience and advanced ideas can make it. The central feature will be a lake, picturesque with Indians in canoes, and affording an ideal means for exhibiting on and around it stock motor boats, which find their logical users among the hunters and anglers. While many game regions will be represented, Canada, especially New Brunswick, and secondly Maine, will be so extensively featured in the next Sportsmen's Show that if the desire for space of railways, camp owners and guides could be satisfied the show could rest upon these territories alone.

An effort was made by the association and corporation to hold a show in March of this year at Madison Square Garden, but owing to interferences which precluded a sufficiently early beginning and the fact that about every exhibition held this season, with the sole exception of the Automobile Show, proved total or partial

failures, it was decided that to wait until 1917 would be a policy of wisdom for all interests.

FEEDING HOUSES FOR DEER AND QUAIL.

J. W. Jameson, of Dutch Flat, California, offers the following suggestion for properly caring for deer during the winter season:

"Throughout the Sierras there are very low places along rivers which deer make every effort to reach. It is at such points that feeding stations should be erected. They should consist of two-story sheds with racks in lower part filled with alfalfa. Hay and wheat should be dropped from the upper story through an hour-glass perhaps once a day on to a fan-shaped table which would scatter the wheat for the quail. I think these feeding houses could be built for about \$400 each. It would be necessary to make a mile each side of these stations a reserve so that no one could shoot around the place. The reserve should be wired off so that cattle could not get to the hay.

"It is safe to say that during our heavy winter of 1889-90, 2,000 or 3,000 deer perished in the Sierras. If we could have had these feeding stations I feel that at least one-half the number could have been saved."

HATCHERY AND FISHERY NOTES.

THE PEOPLE TO BLAME FOR THE HIGH COST OF FISH.

In this issue of CALIFORNIA FISH AND GAME, the Commission begins a series of articles on the commercial fisheries of the State. The object of the series is to arouse the public to a greater interest in our fisheries and induce them to make better use of some of the excellent fish which are now little used. With these articles we will print recipes for cooking the different fish under discussion, along with notes of interest on their habits, seasons, etc. These recipes will later be gathered together in one book. This is in line with work that has been done by the United States Bureau of Fisheries which resulted in the publication of economic circulars on oysters, salmon and tile fish.

The shad has been first selected, for the reason that it will be running in great

numbers when this magazine is issued and those who may become interested enough to try a shad for the first time may be able to procure them at any market and at a comparatively low cost. During the months of April, May, and June, they can be secured in the retail markets for six cents or less per pound, while with them will be salmon, striped bass, and halibut selling for fifteen to twenty cents per pound. Besides these reasons, the shad is as good a fish as these higher-priced varieties and, more than any other fish in the State, deserves a higher place in our esteem.

Our fisheries, particularly those of the ocean, are little developed and will stand a much greater strain than has yet been placed upon them. There are some very good fish in myriads which we have not even begun to use. Comparatively few

fish are eaten in the State, for we have never acquired the fish-eating habit. We have much to learn from the Norwegians, Swedes, Germans, French, Italians and Japanese in this respect. Most of us do not know how to prepare and cook fish and know even less about the names and seasons and the comparative food values of the different species displayed in the markets. Eighty-five per cent of the fish eaten are marketed on Friday. If we would only learn to eat fish any day of the week, or at least have two fish days a week, we could buy fish cheaper. Fishermen fish every day in the week except Saturday, and fish in the market are as fresh on one day as another. Confining the eating of fish to one day a week prevents any great increase in consumption. This, coupled with the great expense of running a market that for six days of the week does little business, keeps the price of fish up. The fault lies mostly with the people and not so much with those who market the fish. It has been the custom to lay the blame for the high cost of fish on the wholesale fish dealer, but this is unjust, for there is at the present time an active competition between these dealers and they are wholesaling their fish at a reasonable figure. Our laws permit fish to be brought in from other states and from Mexico, which in itself would keep down the wholesale price.

We believe that the blame for the light consumption of fish lies mostly with the people and that an awakened interest in fish, coupled with an added consumption, will reduce the cost and that many excellent varieties now wasted will find their way to the people at a reasonable price.

NEW QUARTERS FOR DEPARTMENT OF FISH CULTURE.

On March 1 the office of the Department of Fish Culture of the California Fish and Game Commission, was transferred from Sisson to San Francisco. W. H. Shebley, who for the past twenty-one years has been superintendent of the Sisson Fish Hatchery, and has for the past five years been in charge of all the hatcheries in the State, has been placed in charge of the new department. Mr. Shebley will have offices in the new Call Building. The fish cultural operations of the California Fish and Game Commis-

sion have greatly increased within the past two years. With the opening of new stations in the central and southern parts of the State, it has been found advisable to transfer the head office of the department to a more centrally located section. E. W. Hunt, who was recently appointed special field agent of the Department of Fish Culture, and J. H. Hoerl, chief clerk of the Department of Fish Culture, have also been transferred to San Francisco. Mr. Shebley is succeeded as superintendent of the Sisson hatchery by Captain G. H. Lambson, who for the past seventeen years has been superintendent of the United States Bureau of Fisheries stations in California.

HATCHERIES IN FULL OPERATION.

There are approximately 18,000,000 quinnat salmon fry at Sisson hatchery at the present time. The Commission is planning to hold and feed from 12,000,000 to 15,000,000 of these salmon fry at Sisson hatchery and at the proper time distribute them in the Sacramento and Klamath rivers. Approximately 4,000,000 Loch Leven and Eastern brook trout eggs are being hatched out at this hatchery for distribution in the streams of the State during the coming summer. The rainbow trout egg collection stations on the Klamath River have been opened up, and everything is now in readiness for the egg collecting operations. On account of the very severe storms, the water in the Klamath River and tributaries is very high. The streams are flowing bank full and the water is very roily. Under these conditions the spawning fish will not enter the tributary streams where our racks and traps are located. Every effort is being made to collect a large number of rainbow trout eggs this season, and if weather conditions are favorable from now on there is still a chance that a fair take of eggs may be secured. In addition to the spawning stations on the Klamath River, the board is contemplating opening up the egg collecting station at Burney Creek during the coming month.

The steelhead egg collecting stations at Snow Mountain dam, Mendocino County, and Scott Creek, Santa Cruz County, were opened up during January and February. To date about 500,000 steelhead trout eggs have been taken at Snow Mountain and there are 570,000 eggs on hand

at the Brookdale hatchery from Scott Creek Station.

The Ukiah hatchery was opened up last December and there are 750,000 quinnat salmon fry now ready for distribution. The fry will be distributed in Eel River and tributaries and in Mad River, Humboldt County.

The old Price Creek hatchery, located near Grizzly Bluff, Humboldt County, is being removed to a site on Fort Seward Creek, a tributary of the Eel River, on the line of the Northwestern Pacific Railroad. A modern hatchery will be erected on the new site. With the improved water supply system and better transportation facilities, the Commission will be enabled to do far better work in keep-

March 10 (see Fig. 34). Work on the structure will be commenced at once. The building will be constructed of granite boulders and when completed will have all the latest and most improved apparatus used in modern fishculture. This fine hatchery, designed for the purpose of supplying the streams of southern California and the district as far north as Fresno, as well as the streams and lakes of Inyo, Mono, and Alpine counties, is the result of the untiring efforts of Commissioner M. J. Connell to establish a hatchery that will supply the wants of the people of the district mentioned above for a quarter of a century. The people of the State of California should be proud of what will be the finest hatchery in the world.



Fig. 34. Site of new Inyo Fish Hatchery, Independence, California. Cross marks exact location. Photograph by R. D. Duke.

ing the streams of the northwest coast stocked with fish. Both quinnat salmon and trout will be propagated at the new hatchery. It is expected that the hatchery will be ready for operation by April 15.

About 50,000 Eastern brook trout fry are being held at the Verdi hatchery for distribution in the streams and lakes of the Tahoe region during the coming season. An additional 50,000 fish of the same species are being held at this hatchery for planting in Marlett Lake, to keep up the supply of breeders.

The plans for the large hatchery to be located on Oak Creek in Inyo County, were approved by the Board of Fish and Game Commissioners at a meeting held

FISHWAYS TO BE INSTALLED.

During the past month fishway plans have been made for changes in the Hihn Company dam on Zyante Creek, the Well's dam on San Gregorio Creek, and the California Western Railway and Navigation Company's dam on Putting Creek, Mendocino County. On account of the high water in the streams it has been impossible to do much in the way of constructing fish ladders, but plans are under way to rush the work as soon as the spring freshets have subsided.

SCREENS IN IRRIGATION DITCHES.

Some idea of the importance of screens in irrigation ditches is to be had from the following, reported by an assistant of the

Fish and Game Commission: One haul of a seine through 150 feet of an unscreened canal in Fresno County yielded 1,362 black bass. Black bass are an introduced fish in California and they have become numerous in many parts of the State. In the eastern states large sums are expended in the artificial propagation of black bass, but they have never needed that kind of assistance here, and they are not likely to if they can be kept out of irrigation ditches.

NEW FISH PRODUCTS.

Mr. O. A. Nelson, who for a few months has been manufacturing an excellent fish-food product in San Francisco under the

in time to make caviar of shad and salmon roe. One of their best products will be smoked sliced salmon in oil, for which a good market is developing in this country. Hitherto smoked salmon in cans has been put up only in one place on the Pacific Coast—Astoria, Oregon.

COMMERCIAL FISHERMEN OF CALIFORNIA.

During the fiscal year ending March 31, 1916, there were 3,758 commercial fishing licenses sold in the State. The different fishermen who procured licenses have given on their applications their places of birth as follows: Italy, 1,310; United States, 1,094; Japan, 491; Greece, 184;



Fig. 35. Klamath River bar fishermen, Requa, Del Norte County, California.

name of C-King Fiskboller, has consolidated with the Western California Fish Company of San Francisco. With an enlarged plant he will continue to put up the Fiskboller under the C-King brand and will still do business under the name of Nelson Sea Products Company. He will put up in convenient sized cans, cut, spiced, marinated, bismarked and roll mop herrings. These products have never been put up in cans in this State before. Local fish will be mostly used for the purpose. The company will also put up Christiania anchovies. Another product will be sturgeon caviar, and they expect

Portugal, 152; Russia, 82; Austria, 67; Germany, 58; Sweden, 54; China, 46; Norway, 44; Denmark, 41; Spain, 19; England, 17; Canada, 13; Turkey, 12; Ireland, 10; Scotland, 1; miscellaneous, 63.

COMMERCIAL FISHERY STATISTICS.

The accompanying table (pages 102-3), will show the amount of fish, crustaceans, and mollusks taken in the waters of California by commercial fishermen for the three months ending December 31, 1915, and utilized both in the fresh markets and by packers. This information is made available through the reports submitted

by the fish dealers of the State to the Fish and Game Commission. The figures show under the names of counties the amounts in pounds, unless otherwise stated, of the various species of fish received. This is the first report of the kind ever published on the fisheries of California, and the Commission believes that it will be of considerable value both to the general public and to those commercially interested in fisheries.

A table showing the fishery statistics by counties will be published quarterly in

fish received is small have been grouped together.

It should be noted also that the report does not always indicate the county in which the fish were caught, but rather the county in which they were received for consumption. These coincide in but few instances. Of the fish received at San Francisco, for instance, there is a very small percentage taken in San Francisco County, most of it coming from San Mateo, Alameda, Contra Costa, Solano, Sonoma, Marin, and Mendocino counties.



Fig. 36. A catch of trout in Manzanita Lake, near Red Bluff, Tehama County. The season for trout opens May 1, 1916.

CALIFORNIA FISH AND GAME, along with other information concerning the commercial fisheries. The Commission is now making a complete canvass of the commercial fisheries of the State, and a report of these operations will be published by the end of the year.

While we believe the following table to be fairly accurate and to show practically all the fish received by the various dealers, certain items are not accounted for; as, for instance, fish handled by peddlers and by some fishermen who have sold direct to consumers. Likewise, fish taken by individuals for their own consumption or by anglers are of course not included. Those counties in which the amount of

On the other hand, the figures shown for Del Norte and Humboldt counties indicate fish taken almost wholly within the boundaries of these counties. In the San Francisco Bay region the greatest area of fishing ground lies within the boundaries of Solano County. While large quantities of fish caught in Solano County are taken directly to San Francisco and credited to San Francisco County, the greater part is shipped from various points in Contra Costa County and is credited to that county. Then farther up the river in the delta country of Sacramento, San Joaquin, Solano, and Yolo counties, the fish are collected from the fishermen by the fish buyers' boats and

shipped from the place which happens to be their headquarters. The fish at Santa Cruz practically all come from Santa Cruz and San Mateo County waters, whereas the fish received at Monterey practically all come from waters lying within the boundaries of Monterey County. San Luis Obispo, Santa Barbara, and Ventura counties do not show very large receipts, for most of the fish taken along the coast of these counties and around the Santa Barbara Islands is taken to San Pedro and other points in Los Angeles County and is consequently credited to that county. Practically all the fish shown in the column under Orange County are taken in that county. Fish received at San Diego are taken largely in San Diego waters and off the coast of Mexico. The fish taken in Mexican waters are caught principally by fishermen from San Diego.

CRUSTACEANS.

Crabs are taken in Monterey Bay, along the coast from Half Moon Bay to Bodega Bay, and along the coast of Humboldt County. The spiny lobster fisheries are located along the coast of southern California from the northern boundary line of Santa Barbara County south to Mexico, including the adjacent islands. Practically all the shrimps are taken in San Francisco. Ecrevisse are taken in the rivers of Sonoma County.

MOLLUSKS.

San Luis Obispo County furnishes most of the Pismo clams, although considerable quantities are taken on the beaches of Monterey Bay.

The soft shell clams are taken principally in San Francisco Bay and in Tomales Bay, Marin County.

The small quantity of cuttle fish used are taken by Monterey, Santa Cruz, and San Francisco fishermen.

The shell oysters are from San Francisco Bay and Tomales Bay. The squid, which are consumed mostly by the Chinese and Japanese, are taken in the vicinity of Monterey Bay. The abalones, while found generally along the rocky sections of the coast, are taken for marketing and canning purposes principally in San Luis Obispo, Monterey, and Santa Cruz counties. Abalones are fairly abundant in several other places along the coast, as for instance Sonoma and Mendocino counties,

and there are quite a few shipped from these counties to the San Francisco and Oakland markets.

The large California mussels are taken at various places along the rocky portions of the coast, but are not handled to any great extent by the markets. A smaller variety found in San Francisco Bay is sold in the San Francisco and Oakland markets to some extent.

SHAD SPAWN TO BE FURNISHED EASTERN STATES.

It is interesting now, after forty-five years have elapsed since shad were introduced into California waters, to draw a comparison between our own and the Atlantic shad. The fish in California have increased enormously, while in many of the streams of the Atlantic Coast they have become nearly extinct and the use of nets has in many cases been prohibited. Artificial propagation has never been resorted to here, while on the east coast the hatching of shad is the principal activity of the hatcheries. The wholesale price of shad in the New York market at the present time is \$1.65 per fish, which is more than five times the retail price here. This is not because the shad is a better fish on the Atlantic Coast, for our shad is in every respect as good. In fact, the wholesale price of all varieties of fish on the Atlantic Coast is much higher than of dressed fish sold in the retail markets here. It is proposed during the present run of shad to ship shad spawn to the Atlantic Coast for hatching purposes in the hope of again building up the run in the depleted rivers. The fish and game commissions of Massachusetts and Connecticut are making preparations to restock in this manner the Connecticut River. The eggs will be taken on the San Joaquin River in the neighborhood of Stockton, and after fertilization the development of the eggs will be retarded by refrigeration while they are en route to the Connecticut River. The eggs ordinarily hatch in about four days, but it is believed the hatching period can be prolonged by this method so that they may be successfully transported and the hatching completed after arrival on the east coast. Turn about is fair play. The East furnished us with shad; now we have a chance to reciprocate.

TABLE SHOWING AMOUNT OF FISH, CRUSTACEANS, AND MOLLUSKS
TAKEN IN CALIFORNIA WATERS FOR THREE MONTHS ENDING
DECEMBER 31, 1915.

| Species of fish | Del Norte, Humboldt | Mendocino, Sonoma, Lake | Marin | Solano, Yolo | Sacramento, San Joaquin | Contra Costa, Alameda | San Francisco | San Mateo |
|---------------------------|------------------------|-------------------------------|---------|-----------------|----------------------------|--------------------------|---------------|-----------|
| Albacore | | | | | | | | |
| Anchovy | | | | | | | | |
| Barracuda | | | | | | | | |
| Bonita | | | | | | | | |
| Boeaceio | | | | | | | | |
| Bluefish | | | | | | | | |
| Chilipepper | | | | | | | | |
| Carp | | | | 365 | 12,743 | 12,217 | | |
| Catfish | | 5,265 | | 24,479 | 23,494 | 3,659 | | |
| Coalfish | | | | | | | | |
| Cultus cod | | | 40 | | | | 129,850 | |
| Dogfish | | | | | | | | |
| Flounder | 325 | | 50 | 221 | | 295 | 97,260 | |
| Halibut (California) | 1,482 | | | | | | 1,120 | |
| Hake | | | | | | | 33,835 | |
| Herring | | 2,650 | 95,226 | | | | 5,426 | |
| Kingfish | | | | | | | 14,195 | |
| Mackerel | | | | | | | | |
| Mullet | | | | | | | | |
| Pike (California) | | | | | 185 | 4,623 | | |
| Pompano | | | | | | | | |
| Perch | 1,250 | | 15,653 | | | | 1,108 | |
| Rock bass | | | | | | | | |
| Rock fish (miscellaneous) | 5,587 | | 1,262 | | | | 301,999 | |
| Sole | 500 | | | | | | 1,218,232 | |
| Salmon | 713,222 | 5,637 | 1,618 | 27,303 | 13,280 | 11,014 | 467 | |
| Smelt | 5,642 | | 20,718 | | | | 6,382 | |
| Sea bass (white) | 53 | | 4,609 | | | | 5,139 | |
| Sea bass (black) | | | | | | | | |
| Sand dab | | | | | | | 497,483 | |
| Striped bass | | 733 | 2,463 | 59,165 | 3,656 | 101,151 | 93,000 | |
| Shad | | | 431 | 6,353 | | 31,349 | 595 | |
| Sturgeon | | | | | | 1,293 | | |
| Sardine | | | | | | | | |
| Skate | | | | | | | 33,750 | |
| Sculpin | | | | | | | | |
| Sea trout | | | | | | | | |
| Tom cod | | | | | | 200 | 6,609 | |
| Trout (lake) | | | | | | | | |
| Trout (steelhead) | 33,233 | | | | | | | |
| Turbot | | | 809 | | | | | |
| Whitebait (fry) | | | 1,657 | | | | 2,985 | |
| Yellow tail | | | | | | | | |
| Miscellaneous | | | | | 3,757 | 2,247 | 14,496 | |
| Total fish | 761,294 | 14,285 | 144,476 | 117,886 | 57,115 | 168,048 | 2,380,231 | |
| Crustaceans— | | | | | | | | |
| Crabs, dozen | 537 | 156½ | | | | | 19,861 | |
| Spiny lobster | | | | | | | | |
| Shrimp | | | | | | | 64,609 | |
| Ecrevisse | | 169 | | | | | | |
| Mollusks— | | | | | | | | |
| Squid | | | | | | | | |
| Cuttlefish | | | | | | | 718 | |
| Clams, Pismo | | | | | | | | |
| Clams, cockle | | | 3,907 | | | | | |
| Clams, soft-shell | | 5,374 | 50,000 | | | 108,072 | | |
| Clams, mixed | 595 | | 95 | | | | | |
| Oysters (shell), number | | | 5,415 | | | | | 2,943,650 |
| Abalones | | 96 | | | | | | |
| Mussels | | 40 | | | | | 12,560 | |

TABLE SHOWING AMOUNT OF FISH, CRUSTACEANS, AND MOLLUSKS
TAKEN IN CALIFORNIA WATERS FOR THREE MONTHS ENDING
DECEMBER 31, 1915.

| Santa Cruz | Monterey | San Luis Obispo, Santa Barbara, Ventura | Los Angeles | Orange | San Diego | Other counties | Mexico | Total |
|------------|-----------|---|-------------|---------|-----------|----------------|-----------|------------|
| | | | 1,414,322 | | 14,534 | | | 1,428,856 |
| | 10,944 | | | | | | | 10,944 |
| 5,423 | 11,623 | 51,406 | 197,225 | 202 | 73,526 | | 270,840 | 610,245 |
| | 43,738 | 11,500 | 293,363 | | 16,635 | | | 364,236 |
| | 1,180 | | | | | | | 1,180 |
| | 710 | | 1,338 | | | | | 2,048 |
| 539 | 37,447 | | | | | | | 37,986 |
| | | | 810 | | | | | 26,135 |
| | | | | | | | | 56,897 |
| | 740 | | | | | | | 740 |
| 22,035 | 44,100 | | | | | | | 196,025 |
| | | | 140 | | | | | 140 |
| 75,540 | | | 3,017 | | | | | 176,708 |
| 1,317 | 499 | 500 | 61,319 | 128 | 998,927 | | 848,106 | 1,913,393 |
| 6,717 | | 3,000 | 3,885 | | | | | 47,437 |
| | | | 1,000 | | | | | 104,302 |
| 26,222 | 27,959 | | 83,237 | 89 | 290 | | | 151,992 |
| 113 | 37,009 | 9,650 | 142,019 | 7,343 | 19,646 | | | 215,780 |
| | | | 6 | 16 | | 568 | | 590 |
| | | | | | | | | 4,808 |
| | | | 1,491 | | | | | 1,491 |
| | 279 | 410 | 32,565 | 301 | | | | 51,566 |
| | | | 75,552 | 5,311 | 15,776 | | | 96,639 |
| 77,322 | 263,141 | 8,125 | 201,968 | 16,617 | 511,564 | | | 1,387,525 |
| 285,934 | 5,710 | | 3,544 | | 2,599 | | | 1,516,519 |
| 103 | 762 | | | | | | | 773,406 |
| 2,423 | 20,218 | 12,588 | 59,834 | 129,252 | 27,380 | | | 281,440 |
| 86,860 | 23,822 | 2,923 | 47,455 | | 638 | | 32,500 | 203,999 |
| | | | 2,133 | | 35,546 | | | 37,679 |
| 46,775 | 1,718 | | 5,461 | 347 | | | | 551,784 |
| | | | 20 | | | | | 176,488 |
| | | | | | | | | 38,728 |
| | | | | | | | | 1,293 |
| 1,300 | 3,047,389 | | 9,210 | | 675 | | | 3,053,664 |
| 250 | | | 22 | 54 | | | | 34,076 |
| | | | 2,099 | 20 | | | | 2,119 |
| | | | 7 | 559 | | | | 566 |
| | | | | | | | | 6,809 |
| | | | | | | 192 | | 192 |
| | | | | | | | | 33,233 |
| | | | | | | | | 809 |
| | 152 | | | | 735 | | | 5,529 |
| | 85 | | 352,939 | 619 | 141,752 | | | 495,395 |
| 138,751 | | | 17,170 | | 155 | | | 176,576 |
| 777,714 | 3,579,225 | 100,102 | 3,013,151 | 160,858 | 1,860,378 | 760 | 1,151,446 | 14,109,572 |
| 592 | 2,527 1/2 | | | | | | | 23,674 |
| | | 46,545 | 199,844 | 65,787 | 110,244 | | 23,218 | 445,638 |
| | | | | | | | | 64,609 |
| | | | | | | | | 169 |
| | 369,786 | | 163 | | | | | 369,949 |
| | 485 | | | | | | | 1,203 |
| 2,800 | | 21,218 | | | | | | 24,018 |
| | | | | | | | | 3,907 |
| | | | | | | | | 163,446 |
| | | | 2,483 | 757 | | | | 3,930 |
| | 139 | | | | | | | 2,949,204 |
| 17,050 | 207,794 | 32,750 | 3,761 | 142 | | | 162,991 | 424,484 |
| | | | 13,665 | | 125 | | | 26,390 |

TRY SHAD AS A FOOD FISH.

Much of the blame for the little use made of fish is laid to the housewife. She usually knows little about preparing or cooking fish, and admits it. It is charged, and it appears to be true, that she will choose halibut, salmon or striped bass at 20 cents per pound, and will pass by the shad, rock cod, and other fish at 6 and 8 cents per pound, because the latter are not so easy to prepare and cook. But the man of the house should do his part and learn to be an expert carver so that he may serve fish without its looking like hash. Incidentally, he will probably find

from the right side of the fish by starting at the tail with the back of the fish to the right and cutting close to the backbone, leaving the fin and bones along the middle line of back with the under half. Continue the cut on through the head.

Next sever the backbone near the tail; insert the knife underneath the severed end and split the backbone away from the fish, taking with it the back fin and bones near it; then split away the remaining portion of the backbone, taking the tail fin with it (see Fig 38a).*

With the cut surface of one side uppermost, start at the head and shave away



Fig. 37. The preparation of fillet of shad. Splitting the shad.

his wife does not have the proper tools to work with, that he never sharpens her knives, and that she does not even have proper sharpening apparatus and has to resort to the stove pipe. For this he should take the blame.

Let him pick out a nice shad and then try the different stunts suggested in this issue. If you have not tried shad and do not know much about fish, start out by getting the shad already split at the fish market. If, as it may happen, the fish market man does not know how, show him the directions and figures below, and he will find he can increase his sales by displaying the nicely split halves of the shad and incidentally increase the use of this very excellent, though little used fish.

PREPARATION OF FILLET OF SHAD.

To prepare fillet of shad: Scale the fish, then dress as usual by slitting along the belly. Then, as in figure 37, split the flesh

the rib bones along the inside of the belly (Fig. 38b). Repeat this operation with the other half and the two halves are ready for cooking as in Fig. 38c. The free bones left in the flesh are in a row and easily removed while eating, or, if desired, can be removed before serving. It is considered good taste to pull these bones out with the fingers and to eat the meat attached. To facilitate this method a thin or butter sauce is served on the fish. It will be seen that it is a little more trouble to prepare a shad in this way than it is to prepare a striped bass or a salmon, but the fine flavor and delicate meat of the fish repays one for the entire trouble and, what is more to the point, the shad can be purchased for one-third the cost.

*The illustrations for preparing fillet of shad were kindly posed by Mr. Jack Mene-sini, manager of the California Fish Company.

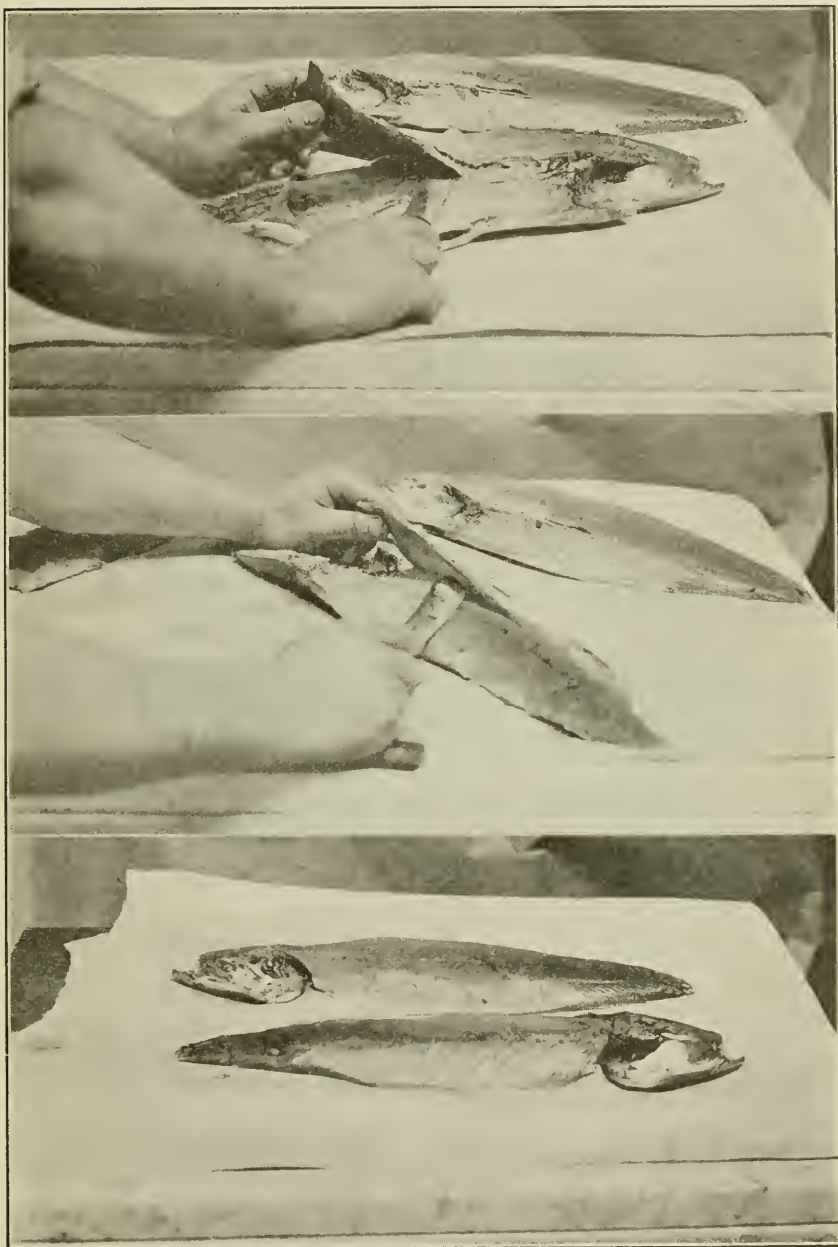


Fig. 38. Successive stages in preparing fillet of shad.

THE REMOVAL OF BONES FROM COOKED SHAD.

To remove the bones after shad is baked or boiled as a whole fish: The secret of success with this method is a very sharp knife. With the back of the fish to you and the head to the right, sever the flesh of the left side from the backbone and back fin much as was done in preparing fillet of shad, except that the meat is cut away from the head. Insert the knife lengthwise into the slit thus made and carefully lift the severed side up and then turn it over and off of the rest of the fish without breaking, care being taken that the bones are left with the lower side. Turn the remaining side of the fish with the bone side down, and with the sharp knife cut between the flesh and the backbone so as to leave the fin of the back with the bones. Then lift this side over as was done with the other, being careful that the bones hold together and are left on the platter. The large rib bones can be removed from the inside of the belly with the point of the knife or the prong of a fork. Slide the two halves, thus freed of the bones, on to a clean platter. If desired, the remaining flesh bones can be taken out by opening the muscle layers along the line of these bones and removing. We are told by those who have used this method that with care and a little experience a person can serve a shad without a single bone. Half the pleasure in eating fish is to have it nicely served, so care should be taken to get the fillets on the platter with the flesh unbroken. Pour the fish sauce (butter sauce) over the fillets and garnish with sprays of parsley and quartered lemon. The ordinary way of cutting the baked or boiled fish into chunks, if employed with the shad, leaves the meat in a chewed-up condition and hopelessly mixed with fine and large bones.

To boil a fish, especially a shad which you wish to keep unbroken so as to remove the bones, it is best to wrap it first in cheese, or butter cloth and tie at each end. It can then be lifted out easily by the two ends after cooking without breaking.

SHAD RECIPES.

The following word of appreciation for the shad with recommended ways of cooking is from Victor Hirtzler, chef of Hotel St. Francis, San Francisco:

The shad is one of the best fishes we have in California and I can not recommend it highly enough. To get the bones out of the shad, split the fish and you will find that the small bones will hang to the larger and come away with the backbone if it is carefully removed. Take a thin knife and shave off the rib bones from the inside of the belly and you will then have all the large bones out of the fish. The other small bones will melt away while cooking. This fish is not appreciated enough on this coast and I can only say that the meat is delicious and easy to prepare in many ways.

Broiled Shad Maitre D'Hôtel.

Split shad and take out bones as given above and season with salt and pepper; roll in a little olive oil and broil. When done, place on a platter and put some maitre d'hôtel butter over it. Garnish with parsley in branches and quartered lemons.

Maitre d'hôtel butter, as follows: Four ounces of butter; season with salt, pepper, little nutmeg, chopped parsley, the juice of a lemon, and mix well.

Shad Meuniere.

Split, season with salt and pepper; roll in a little cream, then flour. Put in frying pan with piece of butter and when done place on a platter. Add to the pan another piece of butter and when brown pour over fish, then sprinkle with chopped parsley and thin piece of a lemon. Garnish with parsley and quartered lemon.

Sweet and Sour Shad.

(for one shad, split.)

Soak one-half pound of spiced cake (called fish cake) unsweetened, which can be obtained in any fancy grocery store, in one glass of vinegar; then add one-half pound of brown sugar; mix well like a mush.

Boil the head and bones in a quart of water, one-half onion, one-half carrot, one bay leaf and two cloves, little parsley, for one-half hour.

Place your fish in pan, season with salt and pepper, pour the above broths over and let cook slowly for twenty minutes; then place the fish on a platter.

Take broth from fish and cook with the cake mush for ten minutes, strain and put back on fire; add one-half pound seedless raisins, bring to a boil and pour over the fish on platter, let stand for one hour and serve cold or hot—never in icebox; just temperature of room.

Planked Shad.

Butter plank and lay one shad on it and put in oven; season with salt and pepper and lay few pieces of butter on top of the

fish. After forty minutes in medium oven fish is cooked; serve potato mashed or in cream with it; garnish the plank with parsley and lemons.

The Hof-Bräu of San Francisco recommends the following methods of cooking:

Broiled Shad.

Clean same as other fish. Take roe out and split from the back. Take bones out, then dip your fillet of shad in olive oil, season with pepper and salt. Put on the broiler and cook for about fifteen minutes. Serve à la maître d'hôtel (butter, lemon juice and chopped parsley), garnish with shoe-string or Parisian potatoes.

Planked Shad.

Cook same as above and serve broiled shad on a plank with duchess potatoes and maître d'hôtel with a few strips of bacon.

Duchess potatoes—Mashed potatoes with yolks of eggs, nutmeg, salt and pepper, but no milk.

Fried Shad Meuniere.

Dip the fillet of shad in milk, season with salt and pepper. Then dip in flour and fry in a pan with equal parts of olive oil and butter. When cooked pour some meuniere butter over it.

Meuniere butter—Brown butter, not too brown, with lemon juice and chopped parsley. Serve duchess potatoes.

Chef Sorensen of the Portola Louvré, San Francisco, considers the shad as good as any fish we have and gives the following varied methods of cooking:

Planked Shad à la Portola-Louvré.

Cut shad in two; put the side with the skin on a hot plank; put in oven from fifteen to twenty minutes; baste same with a mixture of one tablespoon melted butter, two tablespoons cream; one tablespoon anchovy sauce; one tablespoon sherry wine. When nearly finished put border of mashed potatoes and garnish with two strips of fried salt pork and bouquet of Julienne potatoes, parsley and lemon.

Medallion of Shad à la Black.

Cut shad in two, then in pieces about two inches square; put in buttered saucepan; sprinkle with chopped onions, mushrooms and a very little garlic; moisten with wine-glass full of white wine. Put in hot oven for fifteen minutes; take flour and butter and make sauce of juice. Serve with chopped parsley on hot dish.

Shad à la Palestine (for 5 persons).

After the shad is cleaned well, cut in portions the size you intend to serve. Put same in a pot so that it is barely covered with water. Use the head also, as it gives more strength to the gravy. Boil slowly. When about half done add following seasoning: Eight whole peppers, small piece of cinnamon, four cloves, bay leaf and salt. Add onions, carrots and turnips, cut in thin slices; also one-half pint white wine; handful of large raisins, chopped almonds, grated pfefferkuchen; also pumpnickel or rye bread can be used. Let it boil until the fish is done and the gravy thickens. Stir well but do not break the fish up. Can be served cold also, and is very refreshing and nourishing.

Stuffed Baked Shad, Bohemian Style.

When a fish is to be baked it should be emptied through the gills and the head left on. When this is done, wash the fish perfectly clean and prepare a filling of finely grated bread crumbs sufficient to fill it. Season this with pepper and salt; small onion chopped fine, a tablespoonful of chopped parsley and one-half teaspoonful of sweet marjoram; melt a piece of butter the size of an egg and pour over the crumbs after they have been well mixed with the seasoning. Stir together with a knife and mix with it a beaten egg. Fill the fish; lay it on a grate in a dripping pan; season it with salt and pepper and dust it lightly with flour; put in a rather quick oven. When it begins to brown baste it with butter and hot water. A large shad will require an hour to bake.

Make a sauce of half a small teacup of tomato or mushroom catsup, a glass of wine, the juice of a lemon and half a teacup of boiling water. Thicken this with a teaspoonful of flour mixed in a very little cold water and let boil up. When you have dished the fish up if there are any drippings from it in the pan add it to the sauce and pour over the fish; garnish with parsley.

Stewed Shad, Old German Style.

Chop a bunch of parsley and an onion very fine. Put this in a bowl full of tomato juice with four cloves, four allspices, a blade of mace and two chopped crackers. Have the fish cleaned and well washed and lay it in a stewpan. Pour over it prepared tomato juice. Season with pepper and salt and stew very slowly one hour. Thicken with a little brown flour. Add a glass of red or white wine and serve.

Shad Chowder à la Hugo.

Cut three-fourths pound of fat of pickled pork in thin slices; cut the slices into strips and cover the bottom of the pot with some of them. Have ready cleaned, boned and cut in small pieces about six pounds of shad. Lay on the pork a layer of fish seasoned with pepper and salt, put over a few slices of onions and cover this layer with buttered crackers. Then proceed as before with pork, fish and seasoning until you have used up the fish. Cover the top with buttered crackers and put on sufficient cold water to cover. Add a few potatoes cut in dice and four tomatoes cut in pieces. Keep the pot covered closely and stew slowly. If you find it getting dry add a little water occasionally. This may be improved by adding a few raw oysters to each layer of fish. Remove from the pot with a flat skimmer. It may be set in a hot oven covered closely to cook.

Potted Shad, Vienna Style.

After the shad has been cleaned, washed and wiped dry, cut into six pieces across the back, thus cutting each half of the fish into three pieces. Cover the bottom of an earthen crock with fish. Season with pepper, salt, whole allspice, whole cloves and two blades of mace to each layer of fish. Proceed in this manner until you have used all the fish. Cover with vinegar and tie some brown or sugar loaf paper tightly over the top or it may be covered with a large plate. Bake very slowly for four hours. This is a nice relish served cold, and is very popular in Vienna and other German cities, especially on hot summer days.

Planked Shad en Bordure.

Split a shad in half and bone it. Melt a piece of butter mixed with lemon juice and fine chopped parsley. When hot put in shad and season with salt and pepper. Cover lightly with flour and bake in oven. When done put on plank garnished with mashed potatoes. This dish is very easy to make and very popular.

The following two recipes are by the chef of San Francisco's oldest and best hotels. He considers the shad an excellent fish but asks that his name or that of the hotel be not mentioned.

Stuffed Shad.

Take one pint of California oysters, one-half cup melted butter, three-fourth cup fresh bread crumbs, chopped parsley, little chopped onions to taste, two hard-boiled eggs chopped, salt and pepper. Stuff the fish, place in baking dish, sprinkle with melted butter and roast in oven for fifteen minutes; then add pint of sour cream mixed with paprika and let simmer together for twenty minutes and serve in the same dish. Serve roe fried in butter as a garnishing.

Baked Shad.

Split the fish, salt and pepper well, dip in milk and flour and fry in butter for five minutes on both sides; place the fish in a baking dish, put a layer of sliced peeled tomato, and alternate with sliced green pepper on top of the fillet; sprinkle with bread crumbs and melted butter and bake in oven for twenty minutes; pour over the fish brown butter, adding lemon juice and chopped parsley and a few drops of Worcestershire sauce. Serve in baking dish. Have the roe meuniere (fried in butter) as garnishing.

BROILED SHAD.

Pop Ernest, the chef who introduced the abalone to the people of San Francisco, says he considers that the meat of the shad has a sweeter and more delicate flavor than any other fish we have. He prefers the shad broiled to all other methods.

Split the fish to remove most of the bones, dip in olive oil and broil over the coals. Serve with meuniere dressing.

Mr. Chas. Schmitt, formerly chef of Bergez-Franks, says that he thinks shad is one of the best fish on the coast and that it is equal in flavor to the striped bass, but that the reason it is not so popular is the difficulty that most people have in eliminating the bones. With expert handling, he says, the bones can be removed before the fish is cooked. The following he considers two of the best recipes for cooking the shad:

Shad au Four.

Prepare the shad in fillets; season with salt and pepper. Place in a pan some chopped onions, garlic and chopped parsley; lay the fish on these and pour over it white wine and lemon juice. Bake fifteen minutes in moderate oven; remove the fish, then blend fresh butter with garlic and pour over fish and serve. This is a light sauce and is preferred for use with this fish because the shad is often eaten with the fingers on account of the bones.

Shad Duqlère.

Prepare as for shad au four, but add a small amount of tomato and fresh sliced mushrooms.

Mr. Oscar Schori, chef of Tait's, considers the shad one of our best fish and regrets that it is not more popular. He considers the following recipe one of the best:

Fillet the shad and season. Fry to a light brown in olive oil and serve with drawn or brown butter and lemon juice. (See shad meuniere above.)

He prefers the shad fried, but for those who prefer it broiled he thinks it is best to serve with Italian sauce or au gratin.

Fish Sauce (Italian).

Mash together three anchovies, two hard boiled eggs; add teaspoonful of parsley chopped fine and an equal quantity of onion juice. Add yolks of two eggs and teaspoonful of mustard with salt, paprika and juice of a lemon and beat until smooth.

CONSERVATION IN OTHER STATES.**PENNSYLVANIA GAME SANCTUARIES.**

Pennsylvania has now six game sanctuaries established on state lands. Provision has also been made for the establishment of similar sanctuaries on leased lands. These game sanctuaries are surrounded by a fire trail and a single wire upon which are hung notices requesting co-operation in providing safety to the wild life within the refuge.

UNIQUE GAME LAW.

Nevada has a unique game law on her statute books which provides that every

public school teacher shall read to the pupils the game laws of the state at least once a month. The educational value of such a statute is evident.

WILD LIFE PROTECTION FUND INCREASED.

Mrs. Russell Sage has recently signified her approval of the work accomplished by the trustees of the permanent Wild Life Protection Fund by making an additional gift of \$15,000, bringing up her total subscription to \$25,000. This donation followed the issuance of the trustees' biennial report, which appeared in

the form of a handsome book of 100 pages and was sent to subscribers and the leading libraries of the country as a contribution to the current history of wild life protection. The report announces a fund which has been created for medals to be awarded to Boy Scouts of America for achievements along the line of wild life protection. A campaign is now being pushed to establish game sanctuaries in national forests. The definite plan is as follows:

(1) A federal law empowering the Secretary of Agriculture to select and delimit areas in national forests suitable for game sanctuaries. (2) These sanctuaries shall be established by presidential proclamation. (3) These sanctuaries shall be so located that they will not occupy lands chiefly suitable for agriculture. (4) These sanctuaries shall be located where they will interfere to the least extent practicable with the grazing of domestic stock, especially the stock of actual settlers. (5) These sanctuaries shall be established with the approval of the governor of each state concerned. (6) It is expedient to establish a large number of sanctuaries of medium size rather than a few large preserves. (7) The ideal condition would be a chain of sanctuaries which in time would restore game to all the intervening territory. (8) Administration will be vested in the Secretary of Agriculture. (9) Boundaries are to be settled after full consideration of all conditions. (10) Predatory animals are to be killed. (11) The object of these sanctuaries is to provide breeding places for game which will spread over adjacent territory, where it will be subject to the regular open season provided by law. This will prevent danger of overstocking the ranges. It will therefore not be the general policy to extend these sanctuaries.

ITALY STOPS BIRD SLAUGHTER.

Under date of December 8, from Rome, the trustees of the Permanent Wild Life Protection Fund are informed by Frederic C. Walcott that "the Italian Government has at last passed a law, which goes into effect January 1, prohibiting the shooting of all song and insectivorous birds throughout Italy." If this prohibition also includes, as it is only fair to assume that it does, the netting of all such birds, then Italy had indeed carried into effect a great reform. The importance of this action to the birds and the crops of Europe is beyond computation. Hitherto the netting of song birds while on their migrations has been a widespread industry, and the deadly roccollo has each year slaughtered hundreds of thousands of the choicest song birds of Europe for food. Both in America and in England this abuse has been severely denounced, and an American bird protector has de-

clared that it was "a reproach to the throne of Italy."

The causes which brought about this reform in Italy, in spite of the excitement of war, are as yet unknown.—*Zoological Society Bulletin*, January, 1916.

THE TRESPASS LAW IN ALABAMA.

Alabama successfully reduces the amount of hunting by requiring each gunner to obtain a written permit from a landowner before shooting on privately-owned land.

MINNESOTA ADVOCATES FEEDING QUAIL.

Carlos Avery, Game and Fish Commissioner of Minnesota, has issued a card giving directions for the feeding of quail. Loose straw, dead grass, and corn fodder are recommended as material for shelters. Screens, wheat, barley, rye, buckwheat, weed seeds, or corn are suggested as feed, together with a small pile of sand for grit. A pint of food is recommended as a sufficient daily ration for an average covey of 15 to 20 birds. Attention is also called to the fact that the bob-white is beneficial to agriculture and is highly prized as a game bird, and that mink, weazels, and house cats are dangerous enemies of these birds.

EDIBLE BIRDS' NESTS.

CURRENT ITEMS OF INTEREST (No. 27, January 13, 1916), is authority for the statement that, in 1909, 17,781 pounds of the edible nests of swifts, or swiftlets, as they are better called, valued at \$109,849, were exported from Siam. In Hongkong, where the demand for these nests often exceeds the supply, the prices range from \$15 to \$25 per pound, according to quality.

"The first nests constructed in the season, which are composed of pure saliva, are the best for eating purposes. They are gathered on completion before the eggs are laid. The birds then build again, and the second nests, in which the saliva is mixed with rootlets, grass, etc., and often shows traces of blood, from the efforts made to produce the saliva, are also taken on completion. A third nest is then constructed of extraneous substances cemented together and the whole fastened to the wall by a little saliva, the flow of which seems to be practically exhausted. The birds are allowed to rear their young in these nests, which are

ers, so as to compel the construction of afterwards destroyed by the nest-gather-fresh nests the following year.

Edible nests of swiftlets are found in the Malay Archipelago, Australia, and many of the Pacific islands. In northern Borneo certain caves inhabited by these swiftlets produce \$25,000 worth of nests every year and show no diminution in

the quantity, despite systematic robbery for seven generations."

It is interesting to note that the natives of Siam and other countries where these swifts are to be found, have been wise enough to protect the birds from which they derived profit in such a way that the last statement is made possible.

LIFE HISTORY NOTES.

DUCKS FROM THE GREAT SALT LAKE TAKEN IN CALIFORNIA.

Last year there was recorded in our columns (CALIFORNIA FISH AND GAME, Volume 1, July, 1915, p. 191) an instance of the taking at Herndon, Fresno County, of a pintail duck bearing a band which led to the information that the bird had been banded on Great Salt Lake in September, 1914. A second instance of the same sort has come to light in the taking of a banded green-winged teal (*Acttion carolinense*) on the Heidzig ranch, twelve miles west of Delano, Kern County. Mr. Edward Richardson, of Porterville, secured this duck December 12, 1915. Word was received from Washington that this bird was labelled on September 16, 1914, at the mouth of Bear River, Great Salt Lake, Utah, after having recovered from the peculiar malady which attacks the ducks of this lake. Mr. F. W. Velie, of Porterville, also killed a green-winged teal at the same place this past winter which had been banded near the northern end of Great Salt Lake, September 26, 1915. These instances throw further light on routes of migration. It seems quite possible that many of our ducks, and probably also many geese, arrive in California via the Great Basin.—H. C. Bryant.

THE OPOSSUM IN ALAMEDA COUNTY.

Four opossums were killed and several others seen about one mile northwest of Pleasanton along the canals of the Spring Valley Water Company by men who were burning off tules and weeds during December, 1915. A rancher living a short distance from this spot has complained of strange animals which come into his corn and in his chicken yard and has supposed them to be opossums. This is apparently the first instance of the appearance of the opossum in this section of the country.

Opossums are numerous at Arden Station, between Newark and Alvarado, according to the report of Mr. B. Brown, who claims to have seen several, some of them quite large, on his property.—Earle Downing.

FAWNS BORN IN WINTER.

Mr. P. H. Oyer, of Pacific Grove, reports that on December 28, 1915, he saw a doe black-tailed deer (*Odocoileus columbianus scaphiotus*), with two spotted fawns about two weeks old in the sandhills on the Jack ranch, near Marina, Monterey County. This record is particularly interesting, since fawns are usually born only late in the spring.

NESTING OF THE SOOTY GROUSE.

There are a few grouse (probably sooty grouse, *Dendragapus obscurus fuliginosus*) on all of the timbered part of the California National Forest, but in spite of the fact that very few are killed by man they do not seem to increase. This is due principally to their habit of nesting on the ground in exposed places. Ranger M. W. Durham found three nests last spring in the open timber on the north side of Thomas Creek. These nests, which were in pine needles without protection, were watched. The eggs in two nests simply disappeared and the third nest was trampled on by stock.—B. H. Macc.

WILSON SNIPE UNUSUALLY ABUNDANT IN ALAMEDA COUNTY.

Wilson snipe (*Gallinago delicata*) were very abundant in the lowlands near Pleasanton, Alameda County, California, during the latter part of January, 1916. A few snipe are seen in this vicinity each year, but to see thousands of them is surprising. Flocks of twenty-five or more could be flushed at the same time. They would circle about for a few minutes and then alight at no great distance,

dropping almost straight down from high in the air. Two boys whom I saw leaving the hunting grounds each carried a limit of these birds all killed by shooting into flocks. A specimen secured February 11, 1916, gave additional evidence that these birds were snipe and not dowitchers.—*Earle Downing.*

THE OPOSSUM IN AMADOR COUNTY.

On February 1, 1916, I trapped an opossum about six miles from Ione, Amador County, in the vicinity of the Old

Boston Store. This animal weighed fifteen pounds, and judging from the front teeth, one of which was decayed, the animal must have been very old. This is the first opossum ever seen in this county and mystery surrounds the reason of its occurrence. It is more probable that this animal escaped from captivity than that it traveled into this section from some locality where it is abundant. The nearest place from which opossums are recorded is Pleasanton, Alameda County.—*C. E. Tubbs.*

UNITED STATES FOREST SERVICE CO-OPERATION.

FISH KILLED BY MUD FLOW.

Fish in Lost and Hat creeks, Lassen National Forest, were killed during May, 1915, by the mud floods supposedly caused by the eruptions of Mt. Lassen. After the flood, while the water was still muddy, it became unnecessary, and even impossible, to use screens at the intake of irrigating ditches diverting water from Hat Creek and permission was secured to dispense with these screens. If Hat Creek does not become naturally restocked with fish, it should be artificially restocked.—*H. G. Merrill.*

ELK IN SHASTA COUNTY.

Favorable reports are continually received in regard to the band of elk which were liberated near Winthrop, Shasta County, in the early part of 1913. They seem to have spread over a considerable scope of country and are multiplying with a fair degree of rapidity. Elk calves have been seen on several different occasions.—*M. R. Tillotson.*

TRAPPING FOR FUR IN THE SHASTA NATIONAL FOREST.

There is no one in the Shasta National Forest, so far as I know, who makes trapping his sole business, although there are several who do more or less trapping in season. No large catches have been made, and in fact, the business has been so poor that the trappers out each winter usually consist of those who have never tried the game before. The proposed fur farm at Medicine Lake has been abandoned. The greatest success seems to have been in trapping bear, of which more have been seen this year than for several seasons past.—*M. R. Tillotson.*

SIERRA MOUNTAIN SHEEP IN THE MONO NATIONAL FOREST.

The Sierra mountain sheep, at one time so abundant within the Mono National Forest, has probably totally disappeared from this region. A reliable resident tells me that he saw sheep in large numbers on the Sweetwater range in 1882, and Mr. L. Glass, formerly foreman of a large ranch, told me that he saw one in Alpine County about twelve years ago. On many of the high ridges in Alpine and Mono counties one finds heads with horns which do not show very great weathering. A prospector told me that he saw two sheep near Wellington on the edge of the Piuenut range last spring. While I have no grounds to doubt this, I am rather skeptical of its being a fact. However, it has not been many years since these animals existed in this territory and it is possible that a few still exist unobserved.—*W. M. Manly.*

TWO CINNAMON BEARS KILLED IN MODOC COUNTY.

I have knowledge of two cinnamon bears being killed in the western part of the county during the past summer.—*Wm. S. Brown.*

RABID COYOTES IN MODOC COUNTY.

The disease of rabies among coyotes made its appearance in Modoc County recently and on account of the danger to human life and to livestock, the State Board of Health, Biological Survey, and the Forest Service have organized a campaign for the destruction of coyotes. Seventeen hunters are employed, and the entire county is divided into an equal

number of districts, all under the supervision of a chief hunter. These hunters are armed with traps and rifles and use traps and poison in the extermination of coyotes. The situation is serious. Mad coyotes have been killed on the streets of the towns of Alturas and Cedarville. A county ordinance recently became effective raising the bounty on coyote scalps to \$2.50 each. In addition to the government and state hunters many private trappers are at work and the state authorities are giving out poison to all responsible ranchers for use in extermination work.

The enthusiasm with which this campaign is being waged by federal, state and county authorities, as well as by the residents themselves, means, probably, the almost complete eradication of the coyote. This riddance of coyotes can hardly be overestimated as a factor in the conservation of our game. I believe it can be stated without fear of contradiction that the number of sagehens alone will be many times greater next season on account of this campaign.

So much poison is being used in the work that it will probably never be known just how many coyotes have been killed off. The best federal hunter on the job averaged better than a coyote a day during August, September and October. The Modoc County records show that bounties were paid on 1,337 coyote scalps during the period from February 15 to November 1, 1915. As the bounty during this period was only \$1.00, a great many coyotes were undoubtedly killed on which no bounty was claimed.—*Wm. S. Brown.*

TROUT IN GOOSE LAKE.

Lake trout are plentiful in Goose Lake, and the recent lengthening of the closed season will insure an increase in their numbers. The number of these fishes caught the past season was much less than in former years, since fishing for them is mostly over when they are running the streams tributary to the lake and they were practically through running when the season opened. Fishing for them was "too easy" before the season was changed.—*Wm. S. Brown.*

GREY SQUIRRELS IN THE PLUMAS NATIONAL FOREST.

Grey squirrels are so thick in this district of the Plumas National Forest that very few pine or fir cones have been allowed to ripen and disseminate seed for

the past three years, since the squirrels destroy or eat up the crop while in a green condition. During the season of 1913, many became diseased and died. This frightened many people out of using them for food and as a result very few are now killed. It is not uncommon to see 30 or 40 in a single day.—*A. J. Stanley.*

GOOD CASE MADE BY LASSEN RANGER.

There have been a number of violations of the fish and game laws which have come to the attention of forest officers. The only case, however, handled by the forest service was that of John C. Robbins, himself a deputy fish and game commissioner at the time, who was caught by Ranger Harvey Abbey with a freshly killed deer in his possession out of season. Robbins was arrested, tried in the justice of the peace court, convicted, and ordered to pay a fine of \$150 or serve 150 days in jail. This decision was upheld and the fine was paid after some lapse of time, although the case went to the Superior Court and later to the Appellate Court, not on appeal, but on writ of habeas corpus, before it was finally settled. Since this case has already been fully reported on, it is unnecessary to go into the details about it again. It attracted much attention and became widely known, being mentioned at one time to my knowledge even in the Chicago Tribune. It was important since there is every reason to believe that Robbins had been a frequent and flagrant violator of the law and had used his badge and office as a means of violating the law without danger of detection. The effect of this case on the public was decidedly beneficial.—*H. G. Merrill.*

DEER SCARCE IN DESCANSO DISTRICT OF THE CLEVELAND NATIONAL FOREST.

It has been observed that there is an unusual scarcity of deer in the Descanso district of the Cleveland National Forest. Two causes are advanced for the scarcity. (1) All of this district is accessible to the automobile. This fact makes it possible for a larger percentage of people of the class who shoot everything in sight (doe, fawn or buck, in season and out of season) to get into this district. (2) The fencing of the boundary line between the United States and Mexico has no doubt stopped a lot of deer from coming into this district.—*C. O. Brenner.*

REPORTS.

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

December 1, 1915, to February 29, 1916.

Game.

| | |
|--------------------------------|-----------|
| Ducks | 385 |
| Geese | 69 |
| Shore birds | 12 |
| Doves | 5 |
| Quail | 48 |
| Quail traps | 3 |
| Non-game birds | 285 |
| Tree squirrels and skins | 6 |
| Cottontail rabbits | 17 |
| Deer meat | 79 pounds |
| Deer hides | 1 |

Fish.

| | |
|--|------------|
| Striped bass | 580 pounds |
| Steelhead | 923 pounds |
| Salmon | 18 pounds |
| Trout | 14 pounds |
| Black bass | 117 pounds |
| Crabs | 805 |
| Clams | 416 |
| Abalones | 28 |
| Crawfish | 106 |
| Miscellaneous fish | 53 pounds |
| Illegal nets and fishing apparatus | 41 |

Searches.

| | |
|-----------------------------|----|
| Illegal fish and game | 62 |
|-----------------------------|----|

VIOLATIONS OF THE FISH AND GAME LAWS.

December 1, 1915, to February 29, 1916.

| Offense | Number of arrests | Fines imposed |
|--|-------------------|---------------|
| <i>Game.</i> | | |
| Hunting without license..... | 76 | \$1,100 00 |
| Deer, close season, killing or possession, or sale..... | 19 | 420 00 |
| Female deer and skins, killing or possession..... | 4 | ----- |
| Night shooting | 5 | 50 00 |
| Ducks, excess bag limit..... | 1 | 25 00 |
| Using live blinds to approach ducks..... | 7 | 90 00 |
| Quail, close season, killing or possession..... | 6 | 155 00 |
| Shore birds, close season, killing or possession..... | 6 | 125 00 |
| Doves, close season, killing or possession..... | 2 | 25 00 |
| Non-game birds, killing or possession..... | 65 | 793 50 |
| Cottontail rabbits, close season, killing or possession..... | 7 | 85 00 |
| Tree squirrels, close season, killing or possession..... | 3 | 50 00 |
| Total game violations..... | 201 | \$2,918 50 |
| <i>Fish.</i> | | |
| Angling without license..... | 4 | \$70 00 |
| Fishing for profit without a license..... | 6 | 55 00 |
| Dealing in fish wholesale without license..... | 1 | 25 00 |
| Illegal nets | 42 | 2,005 00 |
| Young of fish in possession..... | 2 | ----- |
| Trout, close season, taking or possession..... | 2 | 20 00 |
| Trout, taking other than with hook and line or spear..... | 7 | 300 00 |
| Steelhead, close season, taking or possession; excess bag limit | 4 | 50 00 |
| Shipping and offering for sale undersized catfish..... | 2 | 100 00 |
| Striped bass, underweight, taking or possession..... | 3 | 70 00 |
| Black bass, close season, taking or possession..... | 2 | 100 00 |
| Allowing crude oil to pass into State waters..... | 1 | ----- |
| Crabs, undersized, taking or possession, shipping into closed district | 15 | 95 00 |
| Abalones, undersized, taking or possession..... | 8 | 150 00 |
| Crawfish, under and oversize, taking or possession..... | 4 | 85 00 |
| Clams, undersize, taking or possession; excess bag limit..... | 2 | 10 00 |
| Total fish violations..... | 105 | \$3,135 00 |
| Grand total fish and game violations..... | 306 | \$6,053 50 |

LION BOUNTIES.

Statement of Lion Bounties Paid by Fish and Game Commission From
January 1 to December 31, 1915.

| County | 1915 | Total number on which bounty has been paid |
|-----------------|------|---|
| Alameda | | 1 |
| Alpine | 1 | 1 |
| Amador | | 8 |
| Butte | | 30 |
| Calaveras | 3 | 11 |
| Colusa | 1 | 14 |
| Del Norte | 2 | 78 |
| El Dorado | | 36 |
| Fresno | 1 | 12 |
| Glenn | | 36 |
| Humboldt | 26 | 485 |
| Imperial | 1 | 1 |
| Inyo | 3 | 7 |
| Kern | 15 | 75 |
| Lake | 8 | 84 |
| Lassen | | 6 |
| Los Angeles | 5 | 25 |
| Madera | 10 | 30 |
| Mariposa | 2 | 34 |
| Mendocino | 7 | 163 |
| Merced | | 1 |
| Modoc | | 3 |
| Monterey | 8 | 61 |
| Mono | | 2 |
| Napa | | 3 |
| Nevada | | 3 |
| Orange | | 4 |
| Placer | 1 | 27 |
| Plumas | | 8 |
| Riverside | | 13 |
| San Benito | 2 | 25 |
| San Bernardino | 1 | 14 |
| San Diego | 1 | 28 |
| San Joaquin | 2 | 2 |
| San Luis Obispo | 10 | 57 |
| San Mateo | | 1 |
| Santa Barbara | 4 | 66 |
| Santa Clara | 1 | 8 |
| Santa Cruz | | 1 |
| Shasta | 7 | 189 |
| Sierra | | 6 |
| Siskiyou | 9 | 233 |
| Sonoma | | 14 |
| Stanislaus | 1 | 4 |
| Sutter | | 1 |
| Tehama | 4 | 149 |
| Trinity | 4 | 233 |
| Tulare | 8 | 57 |
| Tuolumne | 7 | 40 |
| Ventura | 7 | 30 |
| Yuba | | 3 |
| Totals | 162 | 2,423 |

FINANCIAL REPORT.

Statement of Expenditures for the Months of October, November, December, 1915, and January, 1916.

| | October | November | December | January |
|---|-------------|-------------|-------------|-------------|
| General administration, salaries, traveling expenses, rentals, supplies, etc. | \$1,475 33 | \$1,593 63 | \$1,602 94 | \$1,630 08 |
| San Francisco district, salaries, traveling expenses, rentals, supplies, etc. | 4,770 02 | 4,867 82 | 4,593 21 | 4,554 99 |
| Sacramento district, salaries, traveling expenses, rentals, supplies, etc. | 3,812 09 | 3,547 66 | 3,639 90 | 3,205 42 |
| Los Angeles district, salaries, traveling expenses, rentals, supplies, etc. | 1,766 87 | 1,578 38 | 1,768 86 | 1,489 61 |
| Fresno district, salaries, traveling expenses, rentals, supplies, etc. | 2,187 80 | 2,194 31 | 2,190 98 | 2,362 06 |
| Hatchery administration, salaries, traveling expenses, supplies, etc. | 452 09 | 649 10 | 527 36 | 554 38 |
| Fishery research and publicity, salaries, traveling expenses, supplies, etc. | 604 91 | 613 67 | 495 08 | 340 21 |
| Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc. | 315 40 | 313 75 | 351 93 | 504 50 |
| Fish transplanting, salaries, traveling expenses, supplies, etc. | 278 78 | 75 71 | 7 80 | --- |
| Fish distribution cars (1 and 2), salaries, traveling expenses, rentals, supplies, etc. | 1,576 65 | 151 80 | 154 14 | --- |
| Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc. | 469 26 | 359 44 | 531 57 | 564 80 |
| Sisson Hatchery, salaries, traveling expenses, supplies, etc. | 1,929 80 | 2,608 56 | 2,001 82 | 1,857 46 |
| Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc. | --- | 25 00 | 275 75 | 230 60 |
| Tahoe hatcheries, salaries, traveling expenses, supplies, etc. | 279 35 | 2 50 | 20 00 | 10 00 |
| Price Creek Hatchery, salaries, traveling expenses, supplies, etc. | --- | --- | --- | --- |
| Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc. | --- | --- | 82 66 | 322 60 |
| Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc. | 67 00 | 107 25 | 31 00 | 126 77 |
| Bear Valley Hatchery, salaries, traveling expenses, supplies, etc. | --- | --- | 157 38 | --- |
| Marlett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc. | 53 22 | 360 05 | 140 15 | 143 42 |
| Fort Seward Hatchery, salaries, traveling expenses, supplies, etc. | --- | --- | --- | 630 71 |
| Inyo County Hatchery, salaries, traveling expenses, supplies, etc. | --- | --- | --- | 191 33 |
| Game Farm, salaries, traveling expenses, supplies, etc. | 382 02 | 277 05 | 323 98 | 434 72 |
| Game research and publicity, salaries, traveling expenses, supplies, etc. | 489 95 | 308 77 | 357 32 | 197 95 |
| Prosecutions and allowances | 220 26 | 289 43 | 288 85 | 397 88 |
| Hunting license commissions and refunds | 2,479 00 | 307 00 | 1,774 30 | 2,234 70 |
| Anglers' license commissions and refunds | 1,191 80 | 294 50 | 1,162 30 | 814 80 |
| Market fishing license commissions and refunds | 11 00 | 50 25 | 69 50 | 61 75 |
| Crawfish and abalone inspection | 200 00 | 200 00 | 200 00 | 200 00 |
| Winter game feeding | --- | --- | --- | 43 37 |
| Mountain lion bounties | 400 00 | 240 00 | 140 00 | 380 00 |
| Printing and lithographing | 1,173 79 | 1,222 72 | 2,324 12 | 532 78 |
| Claims paid account accidents | 3,532 25 | 100 00 | --- | --- |
| Totals | \$30,118 61 | \$22,338 35 | \$25,212 90 | \$24,016 29 |

Balances: November 1, 1915, \$112,532.88; December 1, 1915, \$87,420.13; January 1, 1916, \$88,280.29; February 1, 1916, \$114,625.74.

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Fig. 39. Columbian black-tailed deer (*Odocoileus columbianus columbianus*). Photograph by H. C. Bryant.

CALIFORNIA FISH AND GAME

" CONSERVATION OF WILD LIFE THROUGH EDUCATION "

Volume 2

SAN FRANCISCO, JULY 24, 1916

Number 3

MALFORMED ANTLERS OF DEER.

By FRANK C. CLARKE.

Malformed antlers are not uncommonly found on the deer of the Pacific Slope. Much interest has naturally been attached to this phenomenon and numerous theories have been advanced by the hunters of deer and the students of zoology to account for "odd-shaped," "freak" antlers. Certain facts are known, but just why abnormal forms develop is largely a matter of speculation.

All normal male deer annually produce a pair of antlers. These antlers are developed during the spring and early summer and while maturing they are very tender, sensitive organs, easily influenced by internal as well as by external stimuli.

Each species of the deer family has its general type of antler, this type varying considerably according to the age of the animal. A perfect pair of antlers is exceptional rather than common. Though seemingly normal and well balanced, certain differences exist between the two members. These small differences, so far as one may judge, appear to be normal individual variations. But within each of the species, pairs of antlers will often be found which depart widely from type.

Abnormal antlers are of two classes: (1) Those which are the result of direct external stimuli; and (2) those which are the result of internal or indirect stimuli.

External stimuli are those which directly affect the growing antlers. An antler may be injured by contact with the brush or other solid obstacles. One may occasionally find antlers which have been injured or broken and which have healed much like broken bones, an enlargement or bump being left at the point of breakage. This healing may occur without changing the general shape of the antlers. However, when the injury is severe, the growing antlers may change their shape considerably.

Internal or indirect stimuli are those which influence the growing antler through the general condition of the deer. The health of the animal may be greatly influenced by food conditions. Injuries to the bones, or severe flesh wounds, or injury to the sexual organs may also affect the growth of the antlers. The normal healthy buck produces the most uniformly shaped organs of defense. The fatter the buck during the growing period, the more robust will be the antlers. In a very fat buck the basal portions of each antler possess many small protuberances on the main beam. Such protuberances are as thoroughly normal as are the "eye guards," or basal prongs. The antlers of a thin buck are usually quite smooth.

Malformations are brought about in greatest numbers as well as in most striking forms by the indirect and internal influences. The following groups of cases tend to support this contention.

1. *Effects of Malnutrition.* As noted above, thin deer usually possess slender antlers because these organs have been insufficiently nourished. Antlers of this type are shown in Figure 40. The buck here pictured was kept at the State Game Farm and was very poor in flesh during the spring and summer of 1913. At that time he was probably three years old. Ordinarily, a thrifty deer of that age has several large prongs to each antler. Many other cases, similar in nature, could be cited. It is a well-known fact that deer from the redwood belts, where food is scarce, are seldom fat or large. The antlers are likewise small and slender. Bucks from the oak and chemical districts, on the other hand, are more apt to be large and fat and to possess strong, heavy antlers.

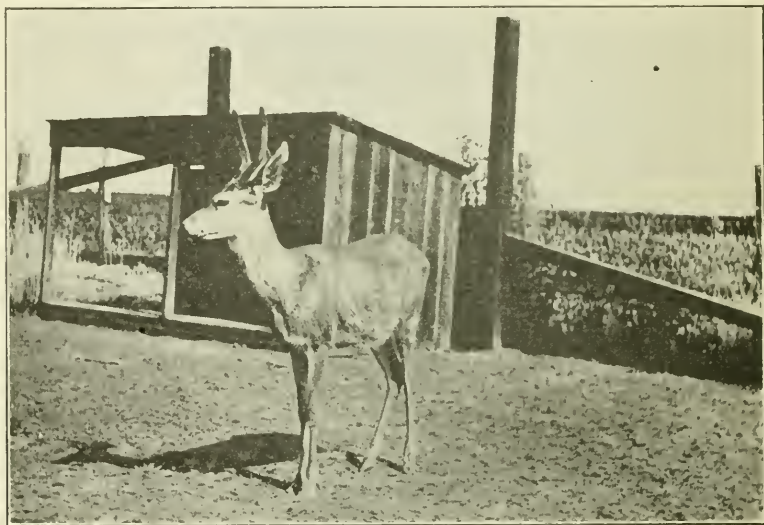


Fig. 40. Malformed antlers of a black-tailed deer kept at State Game Farm. Photograph by Frank C. Clarke, July, 1913.

2. *Result of Injury.* Severe bodily injuries, or the breaking of a bone, may cause the antlers to become malformed. This is not always granted, and many people contend that the malformations are due to injuries to the antlers themselves at the time this other injury was sustained. However, since nearly all injured bucks develop deformed antlers, and nearly all bucks with deformed antlers reveal the presence of a wound sustained at some previous time, and also the malformation in the antlers appears to develop almost always on the same side as the injury, this contention does not seem reasonable. Furthermore, where both sides of the animal have sustained an injury, both antlers will usually become deformed. Injury to the sex organs (testes), is followed by a peculiar kind of malformation which no direct injury to the antler itself seems to produce.

Hence, it is evident that internal, indirect stimuli, as well as external stimuli, may affect antler growth. In many cases both kinds of stimuli

influence the growing antler at the same time. The following authentic cases are given as illustrations of this point:

(a) Large, fat buck, killed August 24, 1905. The antlers were practically mature, but still in the velvet. They were forked and about evenly balanced as to size, but one antler grew at right angles to the other instead of being parallel to it. Upon examination it was found that this deer had had three ribs broken several months before capture.

(b) Large buck with normal antler of three points on one side; on the other side a long, unbranched antler in the shape of a letter S. This buck had previously been wounded in one of its hind legs.

(c) Large buck with normal "four point" antler on one side and a long "spike" on the other. This kind of deformity is frequently reported by hunters. This buck had previously been severely injured.

(d) Very large old buck. Both antlers were extreme freaks. There were several prongs to each member. The antlers were very short; for after growing almost as long as the ears they grew inward and then downward toward the head. They were very irregular in every respect. This deer had previously been wounded in the back of the neck, in one fore leg, and in one hind leg.

(e) Large buck killed in autumn. A normal "three point" antler was found on one side, and on the other side a forked antler which turned inward and downward toward the head. There was an off-set in the bone of one hind leg of this deer, and the fracture was on the same side as the crooked antler.

(f) Similar to (e). A normal antler of three prongs existed on one side, whereas the other turned inward and downward. This deer had been shot through the front leg on the side of the deformity.



Fig. 41. Malformed antlers of coast mule deer stag. Antlers such as these are retained permanently and continue in the velvet. Photograph by F. C. Clarke taken at San Diego in 1912.

3. *Result of Castration.* If castrated when young, a buck will not produce antlers of much size, if any at all; and if antlers are produced, they will be greatly deformed. If castrated when in the velvet the deer will retain his antlers permanently. They will continue to grow slowly but in a very irregular shape and will always retain the velvet (see figure 41). Several hunters have brought in deer in the late winter as well as at other times of the year with antlers in this condition.

It is claimed by experienced hunters that, if a buck is castrated when his antlers are mature and the velvet shed, he will not drop them. This claim is based on the fact that castrated deer have been found with normal "hard" antlers at the time of year when they should have been shed. Evidently these bucks had been castrated after the maturity of the antlers for that year. The cause of the castration of deer in nature is almost as puzzling as that of malformed antlers. Few facts are known concerning this phenomenon.

The commonest form of antler found on deer stags is that shown in figure 42. Each is proportionately large at the base, often from six to ten inches in circumference. The antlers, furthermore, are short and stubby with many knobs or bumps upon them.



Fig. 42. Malformed antlers of unusual type, causes unknown. Photographs by F. C. Clarke.

A "spike" buck (yearling) under observation was castrated when the "spikes" were immature. They remained in practically this same condition for a year, when the deer was killed. A stag that was killed late in the winter when antlers were normally shed, still possessed a pair of "forked" antlers. They were soft and in the velvet.

A very unusual pair of antlers from a medium-sized buck killed near Laytonville, Mendocino County, was brought to my attention in August, 1911. On the left side was a well-formed forked antler about eleven inches long. The velvet had been completely shed. On the right side was a deformed antler not over four inches long. It was about three-fourths of an inch in diameter and maintained its size

nearly to the tip. Over the right eye it curved outward and downward. The surface was roughened by many small protuberances. The velvet still persisted. This deer had previously sustained a severe injury in the pelvic region which tore one of the testes from its position and caused it to shrivel up.

In conclusion:

- (1) Malformed antlers are due to a number of causes.
- (2) Internal as well as external stimuli affect the growth of antlers.
- (3) Castration, or removal of the testes, prevents the growth, development and maturity of the antlers. Hence, the testes apparently produce an influence which is necessary for the development of secondary sexual organs, such as antlers.

EARLY GAME CONDITIONS IN SISKIYOU COUNTY.

[The following statements contributed by A. E. Doney, Peter Klink, and William Russell give a vivid picture of game conditions and hunting in the early days in Siskiyou County—EDITOR.]

In the summer of 1873 my father took a party of six young men, our present sheriff, C. B. Howard, R. Walker, my three brothers and myself, on a hunting trip from Scott Valley to the meadows on Scott Mountain, 10 miles south of Callahan's Ranch. We were in camp six days, and during that time I saw from twenty to sixty deer each day, largely does and fawns; on going up to the higher levels we found bucks. This was the report from all of the party.

My father, W. K. Doney, was a pioneer of California of the '50 period. He did not believe in killing does and fawns; his instructions were to kill only the bucks, and of these no more than needed for meat for camp and a few pounds to take home dried, and this rule was strictly adhered to at all times.

In the summer of 1881, I went over the same ground alone on a hunt of three days and saw no deer, but during those three days the stench of the carcasses of deer that had been killed by hide hunters was in evidence, and I was never out of it until I left the range. I saw the rotting remains of so many deer and became so incensed against the men who were doing the killing that I felt like a man might who would look upon the act as murder. Even to this day, this region has not recovered from the wanton slaughter.

I remember a trip from the valley with my father in 1878. The day we went up North Coffee Creek in Trinity County, I counted 158 deer. The deer paths to the numerous licks below, near the stream, were cut by the deer from one to three feet deep along the hillsides. I killed a fine buck that evening near camp. This was the only deer killed on the trip, as we were prospecting and not hunting. The region to the west of Scott Valley, known as the Marble Mountain country, was, up to 1880, teeming with game, especially elk. One evening in 1876, a party of us were camped at Elk Lake, when a drove of elk, numbering over 75 (that many were counted), came down the opposite hillside to the lake. Two were killed. The last elk disappeared from that region about 1881.

F. M. Blooms, my partner in mining operations at Callahan's in 1881, who had been driving teams for Denny Brothers for five years prior to

that date, hauling freight between Redding and Callahan's, was told by Mr. Johnson, of the forwarding firm of Bush & Johnson, Redding, that in 1880 they had handled 35,000 deer hides from Siskiyou, Trinity, and Shasta counties. I later learned, from men who had bought them, that the average price paid for deer hides was fifty cents each. William Asher, whom I met in southern Oregon, told me that in 1888 he and a man named Bowen had killed deer and shipped 3,000 hides to San Francisco.—A. E. DONEY.

I hunted for Mr. J. H. Sisson ten seasons prior to 1883, at which time I located the farm now owned by Robert Rull. During that period I hunted about the headwaters of the Sacramento River to the west of Sisson Tavern and Strawberry Valley (in which the Tavern is located).

Often in a day's hunt I have seen the carcasses of as many as six deer lying about with the hides removed. This was the result of the hide hunters' work. I did not meet the hunters themselves, because they would hunt during the early summer, then move, so that when I went out for the deer to take to Mrs. Sisson's hotel, I found the deer had been killed off in many localities. The does and fawns were killed as well as the bucks. At no time did I ever kill a deer for its hide, but as there was no law to regulate the bag limit I have killed as many as four and five deer in one day, going out one day, hunting the second day, and returning the third day. This I would do about once a week during the tourist season, July, August, and September, after which the deer would leave the range for the lower hills of Shasta County for winter.

I know that many hundreds of deer were killed for their hides. The hunters came through the mountains and were not seen along the traveled highways. I would always get one or more deer up to the middle of September, when they left the range. The deer were still plentiful when I stopped hunting, but three years later there were very few deer to be found, and from reports I got from others the hunting was poor, and has so continued. I have been told that the deer are more plentiful since protection has been given them. I heard that many deer were killed in the lower country during the winter by squaw men along the Sacramento and Pit rivers who mined a little and killed deer for hides and meat.—PETER KLINK.

In the year 1877, Walter Scott, afterward killed by an Indian on the mountain between Sisson and McCloud while going to Huckleberry Valley where he had his homestead, told me that he killed about sixty deer in less than six weeks. Scott was an old-time hunter and trapper. No use was made by him of the meat, the hides only being taken and the carcasses left in the woods. To my knowledge he had great bundles of hides. The hides probably numbered three or four hundred, and an equal quantity were perhaps obtained three or four times a year. This sort of hide hunting continued for five or six years.

I saw the last two elk that were killed in this district; one, a female, killed by John Burchard in 1872, the other killed by Bob Melson, in 1873. The horns of the latter were placed in the Sisson Tavern office. These were, I believe, the last two elk seen in this country.

The last mountain sheep was killed in Shasta Valley by George Conner on a Sunday morning in 1873.

There are very few antelope left in this country. In the year 1880, I saw forty or fifty on Butte Creek. I was in the Butte Creek country last summer and Mr. Whitney told me there were not more than a half dozen left.

When Bob Melson and I were herding cattle we killed on one occasion thirty-six deer. We took the hides and the best part of the meat and left the remainder. Another time I killed five deer in one day.

In the days of which I speak there were not one-tenth as many people in the country as there are now, and as the game laws were not in existence then, the people killed wantonly all kinds of game. Conditions are quite the reverse at the present time since there is not one-tenth of the game and the country is thickly settled. Therefore, if the laws protecting what is left of the immense herds of deer and other game were removed, all game would be completely demolished.—WILLIAM RUSSELL.

THE TIMBER WOLF IN CALIFORNIA.

By JOSEPH DIXON.

[Contribution from the Museum of Vertebrate Zoology of the University of California.]

Is the wolf in California to be classed as extinct along with the grizzly bear?

Timber or gray wolves of some species undoubtedly existed at one time in a wild state in California, probably within the last fifty years. The observations of early settlers, as well as other comparatively recent reports (Price, *Zoe*, IV, 1894, p. 331), seem to establish this fact with certainty. At the present time, however, there is, other than these reports, no tangible evidence of the former occurrence of wolves within the state, no specimen of a California-killed wolf—skin, skull or bones—being in existence in any collection, to the author's best knowledge. It is quite possible, nevertheless, that wolves still exist in certain remote parts of the state. Frequent reports, based on tracks, howls, or occasional glimpses of the wolves themselves, emanate from various parts of the state, notably from the region known as "Trinity Buttes," at the western boundary of Trinity County; and there are other wild, sparsely-settled sections of the state, which, on account of their natural ruggedness, may still afford sufficient food and protection for wolves.

For several years past the Museum of Vertebrate Zoology, as opportunity offered, has endeavored to corroborate reported occurrences of timber wolves in California, but without obtaining a single specimen. Several quite convincing reports of such captures have reached the Museum from time to time, but whenever the skin or skull was secured, the animal always proved to be a large Mountain Coyote (*Canis latrans lestes*). Under the circumstances it seems desirable that there be placed on record a clear statement of what knowledge we have relative to the present status of the timber wolf in California, with the hope of arousing interest in anyone who may find himself in a position to contribute information. The appended summary of the more conspicuous distinctions between wolf and coyote, it is believed, will enable anyone

who may secure specimens to identify with certainty the animal at hand. In case of the capture of a bona fide timber wolf within the state of California, it is strongly urged that the captor afford the author of this article an opportunity of verifying the occurrence.

There are three recognized races of the coyote in California, according to the latest authority: Grinnell's *Distributional List of the Mammals of California* (Proceedings California Academy of Sciences, 1913, [4th Series] III, pp. 265-390).

The Mountain Coyote (*Canis latrans lestes*) is found in the mountains of northern California, and south in the higher parts of the Sierra Nevada for almost their entire length. The Valley Coyote (*Canis ochropus ochropus*) ranges throughout California west of the Sierra Nevada and the southern Sierras, south to the Mexican line. The Desert Coyote (*Canis ochropus estor*), as its name implies, occurs on the Colorado and Mojave deserts, west to Antelope Valley and north to the Inyo region. The Valley and Desert coyotes are usually distinct in their small size and short hair. It is the Mountain Coyote, relatively large and shaggy, that is generally mistaken for a timber wolf, often through comparison with one of the other coyotes.

Sight identifications of wolves are not always to be trusted, for coyotes seen at a distance, under certain conditions of light, may sometimes appear to the human eye as veritable wolves. This may be due to the person merely misjudging the distance and therefore the size of the coyote, or the refraction of the light waves may possibly cause distortion, and seemingly increase the size of the animal. Neither are footprints to be trusted, for large dog tracks may be mistaken for those of wolves. The voice of wolf or coyote, however, should be distinctive, for one who knows either could scarcely confuse the deep-chested howl of the timber wolf with the shrill yelping of the coyote. With the animal in hand there need be no confusion. Between the largest coyote and the

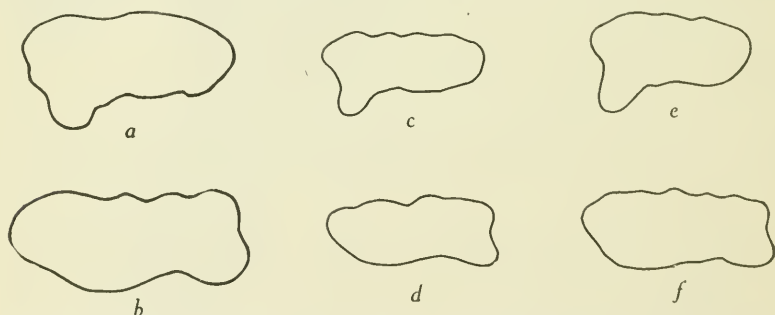


Fig. 43. Outlines of carnassial or "chopping" teeth of wolf, coyote, and dog; natural size. Wolf: a, upper; b, lower. Coyote: c, upper; d, lower. Dog: e, upper; f, lower.

smallest timber wolf there is great size difference. The weight of the wolf averages twice that of the coyote. Seton (*Life Histories of Northern Animals*) gives the weight of three male wolves (*Canis occidentalis*) which he trapped in Colfax County, New Mexico, as 102, 90, and 78 pounds, respectively. Two females from the same place weighed 75 and 80 pounds, while a very poor female weighed only 55 pounds. In speaking of the weight of large male coyotes (*Canis latrans*) Seton gives

42 and 46 pounds as the extremes, with 24 pounds as the average weight of females.

Besides the general size difference there are distinctions of skull, teeth and claws. In making the following comparisons in these regards, the skulls used are of a wolf from Vancouver Island, British Columbia, which is one of the smallest in the Museum series, and a coyote skull from Fort Tejon, Kern County, California, one of the largest of a hundred and fifty or more in the Museum collection. The wolf skull, cleaned, weighs fourteen ounces, the coyote skull, nine ounces. The wolf skull is nine and three-quarters inches long, and five inches broad; the coyote skull, eight inches long, four and one-eighth inches broad. Then, as to the teeth: Those of the wolf are about 50 per cent larger than those of the coyote. This is particularly noticeable in the canines and in those teeth lying third from the back, called "carnassials" or "chopping teeth" (see fig. 43, *a*, *b*, *c*, *d*). In the wolf the upper canine, where it enters the socket, has a diameter of 15 mm.; in the corresponding tooth of the coyote this measurement is 10 mm. In the wolf the upper carnassial (fig. 43, *a*) measures 26.4 mm. in length, 14.6 mm. in breadth; lower carnassial (fig. 43, *b*), 30.4 mm. by 11.6 mm. Corresponding measurements in the coyote are: Upper carnassial (fig. 43, *c*), 20 mm. by 9.3 mm.; lower carnassial (fig. 43, *d*), 22.5 mm. by 8 mm.

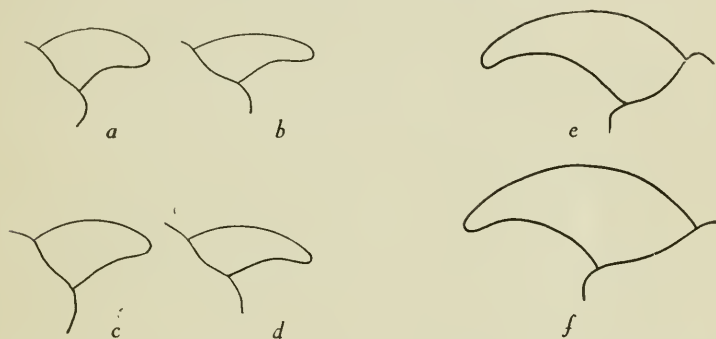


Fig. 44. Outlines of claws of coyote and wolf; natural size. Coyote claws from Sierra Nevada; worn and shortened from contact with stony ground; *a*, front foot; *c*, hind foot. Coyote claws from Colorado Desert; long and unworn; *b*, front; *d*, hind. Wolf claws; *e*, front; *f*, hind.

Another marked difference between the wolf and coyote is in the relative size of the claws (fig. 44, *a*, *b*, *c*, *d*, *e*, *f*). The diameter of the claw at the base should be taken in measuring, as length of claw evidently varies with the character of the soil that the animal ranges over. Coyotes inhabiting rocky regions have the claws much worn down and shortened, from contact with stones, while those living in sandy or loamy places have long claws, showing little wear. Fig. 44, *a* and *c*, represent typical worn coyote claws from the Sierras, while *b* and *d* represent longer, narrower claws from the sandy Colorado desert. One of the heaviest coyote claws noted measured 7.5 by 4 mm. at its base; an average wolf claw measured 11.5 by 7 mm.

In cases where scalps, only, are available, the size of the black nose pad (the naked skin about the nostrils) will be found to be the best character in distinguishing wolves from coyotes. The dried nose pad

of a coyote averages about seven-eighths of an inch in width; that of a wolf, one and one-quarter inches (fig. 45, *a* and *b*). An unusually large coyote skin at hand has a dried nose pad almost fifteen-sixteenths of an inch wide. An Oregon wolf has a dried nose pad one and three-sixteenths inches wide, while in a large Alaska wolf skin this pad measures almost one and one-half inches in width.

No very young wolves have been available for examination. Bailey (U. S. Dept. of Agriculture, Biological Survey, Circular No. 69, 1909),

gives the following color differences between young wolves and coyotes. In the wolf the muzzle is blackish at birth, fading in six weeks to grayish. The head of a young wolf is grayish in decided contrast to black of back, ears and nose. The ears are black at the tips, fading to grayish in about a month or six weeks. In the coyote the muzzle is tawny or yellowish brown, becoming more yellowish with age. The young coyote head is yellowish gray not contrasted with rest of body. The ears are dark brown at the tips and back, soon fading to yellowish brown.

There is great difficulty in distinguishing certain types of dog skulls from wolf skulls. This is often much harder than to discriminate between coyote and wolf. As a general rule the muzzle of the dog is shorter and broader than that of the wolf, the latter being most nearly

approached among domestic dogs by the collie. In all cases, however, there are certain differences to be depended upon, as follows: In skulls of equal size the wolf has much larger and heavier teeth than the dog. While the average dog skull is not as large as that of a small wolf, still, among the larger breeds of dogs there may be individual skulls equal in size to those of timber wolves. In such cases the dog's teeth will be found to be relatively smaller and probably actually shorter and narrower than the corresponding teeth of the wolf skull of equal size, or even of one considerably smaller.

Coyote skulls can usually be told from dog skulls by their more slender form. The long, tapering muzzle of the coyote is in strong contrast to the broad muzzle of the average dog. Like the wolf, the coyote has *relatively* larger teeth than the dog.

On the under side of the cleaned skull, just behind the articulation of the jaw, and below the ear cavity, are to be seen two hollow, thin-walled, bony prominences, roughly circular in shape, and raised conspicuously above the general surface. These are known as the auditory bullae, and their size and shape form excellent characters for distinguishing dogs and wolves. In the dogs these projections are relatively small and flattened; in wolves and coyotes they are large and more prominently raised.

As it is highly desirable that specimens of the California timber wolf be saved before the species disappears entirely from the state, if indeed it is not already too late, the author urges on anyone who has secured, or who may in the future secure, what he believes to be a timber wolf, that he apply the tests outlined above. Any fragment, an old skin in

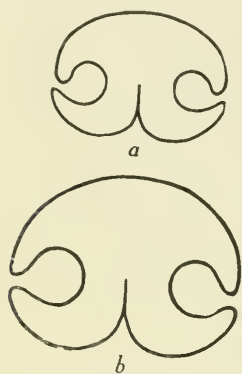


Fig. 45. Diagrams of nose pads; natural size: a, coyote; b, wolf.

part or whole, or any leg or foot bones that may remain attached to such a skin, etc., might serve for identification, and is consequently worthy of preservation. It must be urged, also, that exact information with any specimen is of the highest importance, the principal points to be ascertained being exact date and locality of capture, and name and address of captor.

The author of this paper is highly desirous of getting into communication with anyone who knows of the whereabouts of any parts of wolves killed in California, or who is conversant with *facts* relating to the past or present occurrence of the species within the state.

California Museum of Vertebrate Zoology, Berkeley.

April 14, 1916.

WILL CUTTING THE KELP INJURE THE FISHERIES?

By N. B. SCOFIELD,

In Charge Commercial Fisheries, California Fish and Game Commission.

It has long been known that the kelp along the Pacific coast contains a large per cent of potash, and considerable experimenting has been carried on to find methods of gathering it and of extracting the potash and other commercially valuable by-products.

Germany has hitherto furnished the bulk of our potash supply from the deposits in ancient lakes and seas. The United States Department of Agriculture, realizing the importance of having a source of supply within the United States and hoping to encourage the greater use of potash as a fertilizer, started an investigation of our kelp beds and conducted experiments in extracting potash from kelp. The results of these investigations are to be found in Report No. 100 of the United States Department of Agriculture.

It is believed by the government officials who have investigated the kelp beds along the California coast that there is enough kelp from Point Conception to the Mexican line to supply annually, without injury to the beds, all the potash used in the United States. The amount of potash consumed annually, before the great war cut off the German supply and raised prices, was 300,000 tons and its value was approximately \$15,000,000.

Kelp is composed very largely of water (80 to 90%); to extract the potash profitably large quantities must be handled and a great outlay of capital is required. The rise in the price of potash occasioned by the war has induced several large companies to build plants at Long Beach and San Diego where kelp is now being harvested. The companies operating are Swift & Company, the Hercules Powder Company at San Diego, and the American Products Company at Long Beach. Almost \$3,000,000 has already been invested in southern California in this industry.

There has been considerable uncertainty as to the effect the cutting of kelp will have on the fisheries of the state. Many fear that the kelp beds will be destroyed and the protection which they now afford the beaches will be removed. This they think will greatly injure the clams which inhabit the beaches and the spiny lobsters which live

more or less within the protection of the kelp. They also fear that the young fish, especially the young barracuda, which are in the habit of seeking a refuge in the kelp, will be deprived of this refuge and will leave that part of the coast. It is also believed by many that the kelp beds are extensively used as spawning places by many other commercial fish. It is thought that the removal of the kelp will, therefore, destroy these spawning beds.

Captain Grandell, of the Scripps Institution for Biological Research, at La Jolla, was employed by the government in kelp investigations and is still engaged in watching the effect of the cutting by the several large companies. He and others engaged in the work express the opinion that these companies are not likely, at least within the next few years, to devise kelp cutters or reapers which will cut the kelp more than six feet below the surface of the water, and that such small cuttings can have but little effect. It has been observed that, after one of these reapers has passed over a bed and cut the kelp to a depth of six feet, the uncut kelp branches rise to the surface and it is difficult to see where the cutter has been. Much of the kelp, especially along the edges of the beds, can not be touched and this continues to afford protection to the beaches. It has been pointed out that great masses of kelp are more easily detached from their "hold-fasts" by violent storms than are smaller beds, and it is believed that where beds have been subjected to cutting they will not be so easily washed out by storms. Furthermore, the kelp, though cut six feet below the surface, will continue to serve as a refuge for fish.

The species of kelp which is being harvested in California is the *Macrocystis pyrifera*. This grows in long strands from one to three hundred feet in length which are held to the rocky bottom by means of a "hold-fast." The leaves float out on the surface of the water and are held suspended by floats containing air spaces. The plants reproduce by spores which lodge on the bottom and start new plants; and by stooling or sending off branches from near the hold-fast. If the top end of a plant is cut off, the rest of that particular plant ceases to grow, but the shorter branches, which are continually arising from the base, soon grow up and take its place. Experiments are now being conducted at La Jolla for the purpose of determining the rate of growth of these plants, and it is believed that the cutting of the kelp near the surface will tend to make them stool, so that the growth will be increased by the cutting.

It is to the advantage of the companies engaged in cutting the kelp to avoid destroying the beds, and to cut them only as fast as they will reproduce themselves.

It is believed by government experts that, even if the entire potash supply of the United States were to be derived from kelp, none of the beds would be injured, unless possibly some bed that is favorably located close to the harbor where several companies are at work.

The regulation of the kelp industry in California will come entirely under the jurisdiction of the state, for the beds are all within the three mile limit. It is the desire of the federal government that the state devise and pass such laws as will protect this potash supply and at the same time assure the companies operating of a continuous supply of kelp and protect them from the interference of "pirates." It will

therefore be necessary to enact laws under which kelp beds may be leased or apportioned to operating companies under regulations which will assure continuous crops.

The administration of the kelp resources falls to the Fish and Game Commission. No state laws have as yet been passed in this regard, but several counties have passed ordinances intended to protect the kelp beds. These ordinances have been passed through fear that the kelp beds will be destroyed and bathing beaches and the fishing industry ruined. It is probable that these county ordinances are unconstitutional.

Experts from the Scripps Institution in the employ of the government are continuing their investigation of the kelp-cutting industry and are watching results carefully. The Fish and Game Commission is also keeping in close touch with the progress of the industry with a view toward proposing laws which will conserve this resource upon which one of the greatest industries of the state will probably be based—an industry which may yield more profit than all of the fisheries combined.

FISH AND GAME CONDITIONS IN SOUTHERN CALIFORNIA.

By EDWIN L. HEDDERLY,

Assistant, Los Angeles Branch Office of Fish and Game Commission.

Fish and game conditions in southern California were seemingly better during 1915 than at any time since the need of short seasons and low bag limits was adequately recognized. If the "Protection and Propagation" policy pursued by the Fish and Game Commission needs vindication, it is surely found in the splendid sport which has been built up in the south by the scientific adjustment of the "taking privilege" to the annual increase and the vigorous and uncompromising enforcement of the closed seasons. Conceding the importance of the part played in bringing about this happy result by the culmination of a succession of favorable breeding years, the fact remains that, without the support of fish-cultural work, the trout in our streams would long since have been so reduced as no longer to attract anglers; without wise laws well enforced, our brushy hillsides would have been cleaned of their quail, our canyon-washes of their doves, and our deer would have been destroyed for the men not devoid of energy to go and get them. Instead of this paradise of sportsmen which is so rapidly establishing national records for angling and hunting interest, as evidenced by phenomenal license sales, the south with its wonderful population increase, in which these attractions have played no small part, would long since have forgotten the clarion call of the cock quail and would have come to consider the mournful cooing of the dove as a curiosity. No longer would the southland lure the upland shooter; forgotten would be the lure of the gamest little bird that ever outran dog or tricked the superior intelligence of man. No less of an economic than of a sentimental calamity has been avoided by the long course of carefully-considered, earnestly-executed work undertaken to maintain these sporting assets of the state at the height of their possible attractiveness. All California has learned what these attractions mean in dollars and cents,

waiving for the moment the less tangible aspects. The idea is now growing, however, that the power of fish and game to make the "open places" inviting is a much more significant fact than the dollars-and-cents item.

What the year 1916 has in store for the southern California sportsman is yet to be written as concerns game, although the fishing features have already placed themselves on record. Great as was 1915 in the annals of southern trout fishing, both in average sport and numbers taking part, the current season is certain to be greater. Washed, and literally scoured by the storms of January, which tore down the mountain gorges of the steep San Bernardino and San Jacinto watersheds, ripped out rocks larger than city blocks in places, and generally played havoc with streams east of Los Angeles, the plantings made last October by the Fish and Game Commission appear to have saved the day, and these fry remain in the headwaters in sufficient force to guarantee good late fishing when the waters go down and the fish have grown larger.

So remarkable has been the attention paid to the streams thus far that the noncompetitive nature of trout fishing has asserted itself and caused many of the unthinking to doubt the abundance of fish that the experts readily recognize. With rods twenty to the mile, and more, even the ablest of anglers realizes the impossibility of creeling limits; and no end of heavy stocking can correct the natural shyness of the trout to such a point that all difficulty of taking the fish is eliminated—nor does any true sportsman desire to see the game rendered so easy were it even possible. In one sense the very abundance of anglers has had some little value as a protective feature, for it has rendered large catches difficult and hence placed every possible premium upon the refinement of skill. Hand in hand with the inculcation of respect for short seasons and low limits goes the perfection of refined methods giving equal satisfaction from lessened exercise of the "taking privilege"; and in this we find the four-ounce rod, the gossamer leader, and the fine-artist of the fly coming to the fore in southern California angling, even as the narrowed gauge and lightened weight of the "small-bore" have given the gunner greater pleasure in taking present-day limits than the unpardonable butchery of the ten-gauge days that left every man of fine sensibilities so satiated at the end of a "big day." Difficult as it is to explain the psychology of the sportsman to those born without the Jovian fire, the fact remains that to men who shoot and fish, the carnal elements play no part whatever. The supposed thirst for gore exists only in the imagination of those without capacity to understand what it is that makes mature men run over hills and scramble up boulder-bestrewn streams to the uttermost lengths of physical endurance merely to gather a few hard-earned birds or fish. It is the idealism that makes possible the one that goes hand in hand with the esthetic feature of refining method. There is some of the artist in every sportsman; and the more proficient, the higher proportion of pleasure taken in method rather than in mere aggregate.

Some bass fishing has been built up in the southern reservoirs from the plantings made in years past, although the conditions are not ideal for these fish in most places where they are found. The storms of January destroyed several artificial lakes in which bass have become

well established, but the possibilities of thus propagating them have been satisfactorily demonstrated, and now only time is needed to restore them.

Great interest has developed among surf-anglers in the striped-bass plantings to be made by the Commission in the lagoons and bays wherein fresh water mingles with salt, thus affording the conditions essential to the anadromous nature of these fish.

With the tendency to carry sport to the highest plane of refined method already exhibited in fresh water and upon the game fields, the southern surf-casters for corbina, yellowfins, and croakers, fishes peculiar to these shores, have developed a light-tackle, single-handed, two and one-half ounce sinker-casting technique peculiarly their own. This is far ahead of the advanced type of gear used on the Atlantic, notwithstanding the longer experience of eastern anglers. With the experience gained upon the smaller fish of the surf, and the knowledge of handling the hard-fighting yellowtail of the channel upon lines breaking at less than the weight of the fish, these men will be ready to accord the striped bass a right sporting welcome if he succeeds in adding himself to the list of our surf and bay game fishes. All the rod and reel clubs have pledged themselves to aid in watching these bass and aiding in their welfare.

Fishing off the southern coast has been better this spring than in several seasons. For six weeks an immense influx of barracuda has been literally glutting the markets. The boatmen of Catalina took two tons on hook and line in a single day recently. Although the barracuda is ranked as a food fish and plays a leading part in the fresh-fish supply of the southern markets, it is not devoid of game possibilities, and when taken upon light tackle usually employed by experts in sea trolling, it puts up a tussle that is highly diverting. It has the particularly interesting trick of dodging suddenly if "given its head" which proves profitable to vendors of rods and other tackle. Barracuda, owing to their great speed, break up as much gear as heavier fish.

Yellowtail fishing is the best sport that southern waters affords the sea-angler. The white sea-bass is too uncertain to consider very seriously, but that is its only drawback. It is a surface fighter rather than the dogged, deep-sounding, kelp-hunting "slugger" the yellowtail is. Both species take rank far ahead of the tuna in popularity because much more plentiful. Tuna fishing is a millionaire's game, but the yellowtail is for all, and is so plentiful that sport is reasonably certain. It is doubtful whether any fish of equal weight can put up a more determined resistance, or display more tricks.

For a time opposition was manifested by some of the southern California sea-anglers at the inclusion of these species in the list of game fish for which license is required; but as the idea spread that protecting these species adds materially to the cost of protective work, the sportsmanlike spirit of bearing one's fair proportion of costs has asserted itself so generally that now the license is collected from rod and reel clubmen and big-fishermen generally just as freely as at first it was from the seekers after artificially propagated fish. Eventually the southern California patrol boat will be in use and closer attention will be paid to these marine features than has been possible thus far with the relatively slow and inefficient boats which the Commission has been

able to rent. Fish and Game Commissioner Connell, in charge of southern operations, has taken the position that, so far as possible, the various branches of the work should produce income, each sufficient to meet its needs; and that to divert moneys contributed by hunters to better sea-angling conditions is neither wise nor equitable. This view has been so generally approved by all sportsmen that it may be considered the law, for the principles of equity are deeply rooted in the minds of men who love to hunt and fish.

Among other things that 1916 has proved beyond question is the wisdom of the Commission's plans for a big southern California hatchery in the Owens Valley. Commissioner Connell has devoted more time to the future interests of the state in this matter alone than to the entire detail of his private business for six months past. He has felt that the time is here for something of a permanent nature calculated to put the enterprise of raising fish against future sporting demands upon a sound and enduring business basis. In its inception, the plan was looking fifty years ahead; but so far beyond even the most sanguine expectations has the interest in angling gone already this year that the farthest-sighted program possible today bids fair to prove short of the needs of even five years hence. The Oak Creek plan calls for a capacity of 6,000,000 fish annually, and there is a possibility of so utilizing the forty acres of the site that it may be increased beyond that capacity. Eventually it is certain this must be done. The Commissioners mutually exerted themselves in behalf of a speedy completion of the Oak Creek plant, but it is doubtful whether any fish can be handled there until next year. The plans call for a hatchery building of particularly pleasing aspect, harmonizing with the surrounding because built of stone taken from the site. Against the bold buttresses of the Sierras, its massive and fitting style of architecture will make it one of the state's show-places, particularly because the Eastern Sierra Highway passes within a few minutes' drive from it and the building, perched upon a commanding eminence overlooking the entire Owens Valley, is in plain view for forty miles.

The southern patrol force has been efficiently handled by Commissioner Connell and an effective plan of expansion based on temporary appointments of extra deputies has been worked out to meet the emergency demands of seasonal openings. Already a list of expert men, some of previous experience as peace officers, others as sportsmen, has been recorded. Because it is impossible ever with the present increasing income of the Fish and Game Commission to cover the country constantly with a fully adequate force of men, the plan of meeting the emergencies coming at the opening of the trout season on May 1, the dove and deer season on September 1, and the general bird season on October 15, has been adopted. And should it seem justified, the extra men may be kept on duty a longer time, and they will thus stand an excellent chance of permanent appointment whenever the funds permit such increase. As the number of sportsmen increases, the liability of increased patrol duty is automatically forced upon the Commission and also the wherewithal to finance it in form of license-revenue. Thus the scheme is developing, by actual field training and education, a supply of future deputies fit to keep California far in advance of all states in

the Union in the businesslike conservation of her fish and game resources.

Already the policy of strict enforcement and of publicity and education has reflected itself in a notable growth of the law-abiding spirit. With over thirty men afield watching trout violations, very few license cases were brought, and few failed to carry their licenses with them, although the deputies turned in thousands of names of licensees examined and compelled—willingly enough in the main—to exhibit catches. The growth of favorable opinion was well summed up in the words of one licensee accosted on Bear Lake who produced his license with the words—"Sure thing; that's the cheapest thing I buy." They are realizing that the Fish and Game Commission is merely borrowing their dollars to return on demand at a most usurious rate of interest in bettering hunting and fishing conditions. In view of the great general good accomplished, very much less criticism of relatively unimportant or immaterial details is heard than even a year ago. Men are learning that the business of fish and game is a "big business," to be judged by general results, not immaterial trifles.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

July 24, 1916.

God has lent us the earth for our life. It is a great entail. It belongs as much to those who are to come after us, and whose names are already written in the book of creation, as to us, and we have no right, by anything we do or neglect, to involve them in any unnecessary penalties, or to deprive them of the benefit which was in our power to bequeath.—Ruskin.

LOOK BEFORE YOU SHOOT.

We need but call the attention of our readers to the list of hunting accidents which appeared in the last number of CALIFORNIA FISH AND GAME (Volume 2, pp. 93-94) to bring home the need for following the motto. "Look before you shoot." With a little care the usual list of hunting accidents can be cut down to a minimum. The law definitely states that the only deer which may be killed during the open season are those having antlers. Not even spiked bucks are allowed to be taken. There is, therefore, little excuse for the man who mistakes a man for a deer. *Be sure you see the antlers before you shoot.*

DEER HUNTERS ATTENTION!

SAFETY FIRST!

HUNTERS' RULES.

1. Never crawl or creep.
2. Wear a conspicuous coat, hat, or hatband.
3. Be sure you see and know what you aim at.

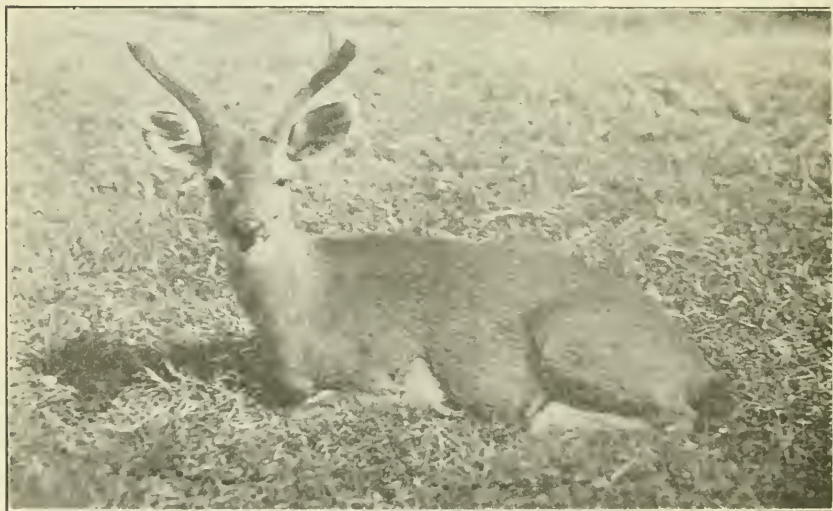


Fig. 46. Columbian black-tailed deer.

THE EDUCATIONAL FUNCTION OF THE DEPUTY.

Although the detection of the violator forms an important aspect of the work of the deputy, his more positive and inclusive function is the guarding of the wild life resources of the state. To fulfil this function knowledge is all important. The deputy should therefore know all the various forms of wild life in his state and should be familiar with their life history and habits. The district in which he lives will depend upon him for information of this kind and the scientist will look to him for adding to the store of useful information on the occurrence of unusual species or extraordinary habits.

All information on the status and life history of the various species of wild life and on the work of the Fish and Game Commission should be sent by the deputy to the Bureau of Education, Publicity and Research, California Fish and Game Commission, Berkeley, Cal., where it will be properly utilized. Whenever possible, photographs and illustrative specimens should be collected as evidence. The publications of the Commission, which aim to record and disseminate the knowledge thus collected, should be kept constantly in mind and pertinent material should be sent for them. These publications are CALIFORNIA FISH AND GAME (quarterly), TEACHERS' AND FARMERS' BULLETINS (published at irregular intervals) and the BIENNIAL REPORT.

Accurate scientific data must always be the ground work for adequate legislation, and the contribution of such data by the deputy is an important phase of his work.

Another aspect of the educational function of the deputy is the spreading of the doctrine of wild life conservation. Emphasis should ever be laid upon methods of conservation rather than upon methods of destruction. The people in the district in which a deputy is at work should be kept informed as to the aims of the Fish and Game Commission and of the deputy's individual work. Every effort should be made to gain co-operation, not only to the end that game laws are enforced, but that wild life is properly conserved.

A person educated to the value of and the need for game conservation is a greater force in wild life protection than a violator brought to justice. The local

newspapers are valuable mediums in developing proper sentiment as regards wild life and should be utilized continually. Organizations such as game protective associations, women's clubs and schools can be made valuable allies in constructive work along the lines of wild life conservation.

Nothing can be of more permanent value to the cause of wild life protection than a campaign of education conducted officially by the state department whose function it is to conserve the wild life resources.

VENISON CAN BE DISTINGUISHED FROM OTHER MEATS.

In past years the California Fish and Game Commission has often failed to convict violators of the deer laws when the evidence was in the form of dried or smoked meat and the identity of meat remained obscure or unknown. Provided the meat contained small bones or skin it could usually be identified, but otherwise no means was at hand for distinguishing whether or not it was venison. Through the co-operation of Professor F. P. Gay of the Department of Pathology of the University of California and Mr. Frank C. Clarke, formerly a member of the scientific staff of this Commission, a method has been worked out whereby, through the use of a precipitin test, venison can be distinguished from bear meat, mutton, beef, goat, or any other meats, no matter in what form it has been prepared. This method is the same as that employed in European countries in the diagnosis of meat and meat preparations where fraud is suspected.

The precipitin test is prepared in the following manner:

Antisera for venison is first prepared by injecting fresh serum from deer blood into rabbits by intravenous and by subcutaneous injections. These injections by each method, respectively, are given on three successive days with a three-day interval. The blood is then withdrawn antiseptically from the rabbits and a serum extracted. This precipitin, when placed with a weak extract made from deer flesh with sterile physiological normal salt solution, forms a cloudy precipitate, but when placed with an extract from the flesh of any other sort of animal, does not form a precipitate. This test

has been used in important cases in California and has been instrumental in convincing the jury that the meat in question was venison.

ADVANTAGES OF A BUCK LAW.

The following quotations from an article published in 1915 by Mr. John B. Burnham, president of the New York State League for the Protection of Fish and Game, appeared in a leaflet issued by the National Educators Conservation Society. They clearly point out the advantages to be derived from such a deer law as that possessed by the state of California:

"Insures 'perpetuation of a species which not only furnishes sport * * * but also provides a valuable food supply. The farmer sells his bull calves and wether lambs and saves the heifer calves and ewes, and similarly under a buck law the buck deer are killed and the does saved so that the future supply will be assured."

"Prohibiting sales of game, reducing bag limits, and shortening open seasons are none of them as good as the present buck law. Short seasons mean overcrowding with hunters and grave danger to human life. 'With deer, the law protecting all animals except those bearing horns exactly meets the situation. Where such a law is in force a longer open season can be given with the resultant advantage of less crowding in the woods at any one time and a fair bag limit can be permitted without endangering the supply."

"Protection of the does protects the fawns also. 'For two years, while the law permitting the killing by still-hunting of both bucks and does was in force, only one deer out of four shipped over the Adirondack division of the New York Central Railroad had horns; the others were does and fawns."

"The buck law saves human life. In 1909-10 in five states without the buck law 40 lives were lost and over 100 wounded. In 1910-12 in nine states having the buck law NO lives were lost. 'Under the present buck law in New York state * * * there was no case during the last hunting season where anyone was killed by being mistaken for a deer. On the other hand, there were 24 deaths from hunting accidents in Wisconsin, a state having no buck law."

"The law stands the test. Vermont has given the law the longest test. It is the only state in the Union today which complains with reason of too many deer."

"Buck-shooting requires true sportsmanlike skill. Hunting does is like shooting cows in a barnyard."

"Even the opponents of the buck law in New York admit the tremendous increase of deer which has occurred during

the three years it has been in operation. Vermont would have no more deer today than it had in 1875 were it not for the protection of does. George Shiras, 3d, the famous big game hunter, photographer and naturalist, with the assistance of Dr. Fisher and Professor Beal of the Biological Survey at Washington, recently prepared a table which shows that with a buck law good shooting is afforded and the supply of deer increased under exactly similar conditions which spell extermination with the other law.

"For the purposes of the comparison it was assumed that a breeding stock of 24 bucks and 24 does, age two years, were available and that the increase annually thereafter was one and a half fawns per pair. The ratio would not of course be affected if a lesser or greater number were taken as the original stock or increase.

"Under the old law, assuming that 50 per cent of the deer were shot annually, extermination would result at the end of ten years, during which period 155 deer would have been killed.

"Under the same conditions, assuming that 50 per cent of bucks only were killed, at the end of the ten-year period 781 bucks would have been bagged and there would remain a breeding herd of 781 bucks and 1,562 does, or a total of 2,343 live deer in the woods. If 72 per cent of the bucks were killed the hunters would have secured 1,170 bucks and there would be left a breeding stock of 1,952 deer.

"That there are more bucks in the forest for hunters to shoot shortly after the adoption of the new law," says Mr. Shiras, "than does and bucks combined under the other law, ought to satisfy even the selfish class who have no regard for the rights of future generations, or the efforts now being made to prevent the extermination of wild-game."

THE ADVANTAGES OF A BUCK LAW, THEREFORE, ARE:

1. In successful operation today in a majority of the important deer-producing states.
2. Protects human lives.
3. Is based on common-sense breeding principles.
4. Increases the stock of deer wherever given a fair trial, as in the state of Vermont.

DEER DIE FROM PECULIAR DISEASE.

During July, 1911, deer began to die in southern Trinity County and the epidemic spread over the southern half of this county and passed into Humboldt and northern Mendocino counties. From descriptions and from evidence obtained this disease, at least as found in Trinity

County, was due to an infestation of bladder worms, which parasites developed on the intestines, liver, lungs, and other vitals of the deer.

Reports this last spring (1916) from two sections of the state indicate that hundreds of deer have again died from some peculiar disease. Deputy Perkins, of Fort Bragg, reported that a number of deer were found dead, presumably from disease, in the Point Arena section. Deputy G. O. Laws, of Weaverville, Trinity County, reported that conditions on and near a part of the Trinity Forest game refuge (district 26) were serious. Large numbers of deer were found dead. They were in fine condition and could not have died from starvation.

of the Fish and Game Commission also make note of the deer killed in their respective districts. Where no actual records have been kept, a reliable estimate has been obtained from residents conversant with local conditions. These reports, although incomplete, afford a basis for an estimate as to the kill of deer each year. Records of this kind have been kept since 1911, during which year 6,489 were reported as killed. The total number reported in 1914 was 8,699, as compared with 8,343 for 1915. It seems possible that fewer hunters may have been in the field in 1915, thus causing a reduction in the number of deer reported as killed. The discrepancy may be due also to a greater degree of

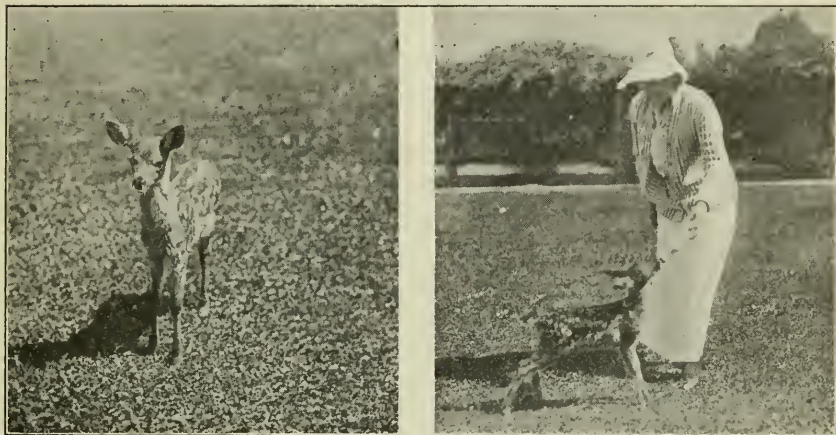


Fig. 47. Anticipation and Realization. Black-tailed deer fawn being reared at the State Game Farm, Hayward, California.

Examination seemed to show that they had died of the same disease which attacked deer in Trinity and surrounding counties in 1911. A later report from Mr. Laws states that the disease spread over a large part of northern Trinity County, and was fatal to many deer. Mr. Jesse Smith, of Hawkin's Bar, states that he thinks fully one-half of the deer died in his section.

AT LEAST 12,000 DEER KILLED IN 1915.

On page 168 of this issue will be found a computation of the number of deer killed during the hunting season of 1915. Data on deer killed in the National Forests are obtained by forest rangers, and deputies

incompleteness in returns. The total kill for 1914 was estimated to be at least 12,000, and the figures of this year lead to a like estimate.

When segregated for each county the figures furnish interesting evidence as to the distribution of deer in this state, although in some cases large kills are indicative of concentrated hunting rather than of large deer population. If the actual figures are depended upon, Siskiyou County leads in the kill for 1915, with Monterey a close second. Trinity County, which headed the list for 1914, drops into third place. In southern California, Santa Barbara County alone shows a kill which compares favorably with northern counties.

The main object of this computation is the assembling of data which will lead to better administration of our deer supply. The factor most necessary in conserving the supply of wild life is the provision of a sufficient breeding stock. The computation of the toll taken each year leads to a knowledge of the needs of the species as regards breeding stock and thus allows a basis for proper legislative measures to meet the changing conditions from year to year. Up to this year the records have shown a steady increase in the number killed. Should a steady decrease now be shown from year to year, evidence will be at hand that the breeding stock is being impaired and steps will have to be taken to give deer better protection.

SALT LICKS FOR DEER.

Several seasons past it was reported by a forest ranger that in a certain district in the Trinity National Forest the cattle had monopolized the natural licks to a large extent and that the deer were hunting salt licks in the mud along the Trinity River. He recommended that salt be furnished for the deer in such localities. In order to try out this scheme experimentally, the Fish and Game Commission last spring furnished the forest service with twenty five-pound Leslie salt bricks, half of them equipped with hangers and the others without hangers. These were distributed to the district rangers to be used in suitable locations where frequent observations could be made by a forest officer. Eight bricks were furnished the Big Bar District and two were sent to each of the other districts. The results for the various districts as reported by Supervisor Coffman are as follows:

Big Bar District. District Ranger Braunan reports:

"On August 1, 1915, I shipped two salt bricks to Bert Higgins at the Keystone Ranger Station. They were placed on a deer crossing at the mouth of White's Creek. The deer seemed afraid of it. Guard Higgins made a solution of salt and sugar and rubbed it on the tree around the bricks. The deer licked the bark of the tree all smooth before the bricks were touched. From the first night on, two deer came until the sugar was gone. After the fifth night there were from two to ten until the salt was gone.

The salt places at Helena and Digger Flat established about August 1st, were used very little up to November 20th.

On August 3d, I placed two bricks near the Waldorff Ranch. The first night only one track was noticed; second night there were more tracks, and from the third night on, until the salt was gone, the ground was all torn up. The salt lasted only four weeks.

On August 8th, I placed two salt bricks on Don Juan Creek. There seemed to be only a few deer in that section. On the first night four deer found the salt and continued to use it or were still using it the last time I was there on October 20th."

Hayford District. District Ranger Everest writes:

"Guard Duncan placed one of these salt blocks in approximate Sec. 33, T. 30 N., R. 11 W. The other was placed by Guard Randolph in Sec. 19, T. 1 S., R. 8 E.

The blocks were in each case placed where deer were plentiful. They were examined several times during the season and both guards report that the deer have made absolutely no attempt to use them."

Mad River District. District Ranger Gray reports:

"Only one of the salt blocks forwarded to this district to be placed on the range for deer was placed this season. This block was placed near C. H. Matthews' cabin on the South Fork River, where a considerable number of deer are found, and which very few range stock frequent. Mr. Matthews advised me that he was interested in the matter, and if I would place the block in the vicinity of his home he would keep a careful record as desired by the Commission; this he has done. On or about August 1st, the block was placed at a point about 400 yards distant from Mr. Matthews' cabin near a large thicket of brush which many deer frequent. The block was attached to a large fir tree about three feet from the ground. All leaves and trash were removed from around the base of the tree so that tracks could be readily seen. Mr. Matthews visited the lick twice a week during the fall, or until he left the South Fork, which was about October 20th. He reports that deer approached within a few yards of the lick but none were known to have used it. Mr. Matthews will resume his observations about April 1, 1916."

Lower Trinity District. District Ranger Graham reports:

"I put the two cakes of salt out; one I put near the river below the Douglas Ranch and the other I put near the trail to the Four Mile Ranger Station. The deer immediately found them and they were eaten in less than a month from the time I put them out.

Deer in this locality are usually "salt hungry" during the summer and will travel a long distance to a salt lick, and no doubt a reasonable amount of salt

distributed on the ranges would be of benefit to them."

Stuarts Fork District. District Ranger Chamberlain writes:

"I received two bricks of the salt referred to, one to hang on a tree, the other to be laid on the ground. I gave the one to be hung on a tree to Guard Mahoney and requested him to place it on Montgomery Ridge east of the Buckeye Ranger Station, and to visit it occasionally to see how much of it was used. Just before Mr. Mahoney left the station, which was on September 30th, he stated that deer had not made use of the salt brick.

The brick to be laid on the ground I put on the top of Browns Mountain, just north of the wagon road between the Costa place and Eli Cambon's. I visited it quite often and as long as it stayed there it was not used. After about three and a half months it was missing. Someone evidently carried or threw it away.

I saw numerous fresh deer tracks and cattle tracks also, which showed that both deer and cattle had walked over the salt brick, and passed close by it; but as I stated before it was not used. I think the reason is this: Costa salts his cattle with ordinary cattle salt in his corral and in a gulch about one half mile north of the salt brick, and I think that both cattle and deer prefer the cattle salt. I have seen deer using the salt put out by Mr. Costa.

On Buckeye Mountain the sheep men put out salt for their sheep which the deer use in preference to the brick. And it may be that they are afraid of the brick salt, although I hardly think so."

No reports are at hand from the Hyampom and Yola Bola Districts.

While the reports from three of the districts appear to indicate failure there, the results in the Big Bar and Lower Trinity districts are distinctly favorable, and if the Commission wishes to continue the use of salt for deer in these districts we will be very glad to distribute it and make further observations.

WAR TO BE WAGED ON ENGLISH SPARROW.

Sentiment against the European house sparrow, commonly called the English sparrow, has become so strong that the Fish and Game Commission has decided to carry on a publicity campaign, which it is hoped will lead to a better control of the pest in California. A leaflet giving methods of identifying "English" sparrows and means of destroying them will soon be issued. In addition, a campaign of publicity will be undertaken to encourage a united effort to rid California of this bird pest. A week will be set aside during which everyone will be asked to co-operate in the destruction of

sparrows, and all of the deputies of the Fish and Game Commission will be set to work killing sparrows and directing others in the work. As elsewhere, the European house sparrow is filthy in its habits, is destructive to crops, and in addition drives out native insectivorous birds which are beneficial to man's interests. There are few who will mourn if the "English" sparrow is lessened in numbers, and there are many who will greatly appreciate any effort to destroy these objectionable birds.

San Diego has already engaged in an active campaign against these birds. An ordinance appropriating \$125 for sparrow destruction was passed on April 5, 1916. The task of destroying sparrows was given to one man who is to receive five cents apiece for all "English" sparrows killed. The campaign seems to have met with considerable success. Similar measures should be instituted in other cities of our state.

JUDGES GIVE SEVERE SENTENCES.

The judges of the state are taking more and more interest in enforcing the fish and game laws. During the past few months several heavy penalties have been exacted from violators. Since January 1st, eleven jail sentences have been imposed for various violations of the fish and game laws. Three of these sentences were for a period of 150 days, in two cases for killing does and in the third case for fishing with illegal nets. In two instances offenders were given no alternative to the jail sentences.

SNOW MOUNTAIN DAM HEARING.

A hearing was held by the Fish and Game Commission on April 1, 1916, at Upper Lake, Lake County, regarding conditions relating to trout and salmon at the Snow Mountain dam on the south fork of the Eel River.

The meeting planned by Mr. M. E. Benedict, supervisor of the California National Forest, was well attended: about sixty men were present, some of whom had come from Lakeport, eleven miles distant. Mr. Benedict acted as chairman and brought out the following points as the main objects of complaint:

1. That, whereas fish were formerly very abundant in the upper part of the

South Fork of the Eel River, they are now few in number and little or no restocking of the streams has taken place since the Snow Mountain Dam was constructed and spawning operations begun.

2. That no large fish are to be found above the dam.

3. That in the spawning operations carried on at the Snow Mountain Hatchery many fish not used for spawning are prevented from reaching the upper part of the stream.

4. That the fish ladder does not appear to be adequate and that most of the fish are unable to reach the stream above (see Fig. 49).

After talks by the representatives of the Fish and Game Commission (N. B. Seofield, F. H. Shebley, and H. C. Bryant) the meeting was thrown open for a discussion of the points.

The meeting lasted for over two hours, at the end of which time the following resolutions were unanimously passed:

1. That the fish not used by the Commission for spawning purposes be allowed to pass into the stream above the dam instead of below, as has been done in the past.

2. That the Fish and Game Commission plant a large number of trout fry above the dam this coming season.

3. That it be the sentiment of the meeting that the fish and game laws of

the state be observed and enforced.

4. That an investigation of the fish ladder be made to find out whether or not the fish are deterred by the ladder from passing up stream.

5. That special provision be made to see that the first run of steelhead trout be allowed to ascend the stream unmolested until spawning operations are begun.

It was clearly brought out in the discussion that the hatchery as at present operated is a detriment to the restocking of the stream above the dam, in that the fish not used for spawning purposes are liberated below the fish ladder and are unable to reach the upper stretches of the stream. An investigation of conditions at the dam, on April 2d, showed that with small expense the fish for spawning purposes could be taken from the fish ladder near the spawning house and, by means of a flume run to the fish ladder just above, those not used for spawning could be returned to such a point on the ladder that they could easily reach the stream above. The three representatives of the Commission unanimously recommended that such a change be immediately instituted.



Fig. 48. Snow Mountain Power Company's dam in Mendocino County.



Fig.49. Fish ladder at Snow Mountain dam, Mendocino County. Investigation has shown that fish readily ascend this ladder.

WILD GAME AND ITS PRESERVATION.

Under the title "Wild Game and Its Preservation—A Correction of Some Popular Fallacies" the San Francisco *Examiner* has been running a series of articles attacking the State Fish and Game Commission and defending the market hunter. The author of the series is Mr. Fred S. Walker, of Los Banos, a former newspaperman. Mr. Walker contends, in the first place, that all of the waterfowl of the interior valleys are on the road to extinction, owing to reclamation projects. So long as they will soon be entirely exterminated, he says, let us make the best use of them possible at the present time. This use is, he points out, to place them on the market and to allow the market hunter free range even to the extent of dispensing with the limit law. Many of Mr. Walker's arguments are false and his statements inconsistent. As an example of his inconsistency the following conflicting statements may be noted. He writes: "The game of the valleys—irrespective of 'preservative' laws—is fated to become extinct. Its destiny is beyond the control

of any Commission." In another paragraph we find: "As practically all our ducks and geese are bred in the isolated provinces of Canada, and their foraging is detrimental to the garden industry of this state, and as the shooting of a million birds here every year would not materially affect the supply, it would seem the part of wisdom to wipe out the fifty-a-week limit on these birds and to open up the markets of the state for their sale so that all might enjoy on their tables the flesh of wild life." If waterfowl are doomed to extinction in the interior valleys how can such an inexhaustible supply still be forthcoming as is suggested in the second sentence?

We need not give further comment to this series of articles. We are sure that no one will be hoodwinked into believing that out game should be slaughtered with no restriction simply because reclamation is fast reducing numbers. Nor do we believe that people will accept the derogatory statements against the Fish and Game Commission. The Commission is searching for methods of conserving wild life, not for methods of destroying it.



Fig. 50. Valley quail chicks at State Game Farm. Photograph by H. C. Bryant, May 29, 1916.

IS IT ANY WONDER?

The number of hunters is increasing from 5 to 10 per cent each year; facilities for getting to what were formerly inaccessible places have increased, it now being possible for a man with an automobile to go one hundred miles or more away from the railroad in a few hours' time; game country in which a gun was never heard a few years ago is now overrun with hunters; ranchers are crowding into all parts of the state and thus restricting the breeding ground of game; guns have been perfected so that now five shots can be fired into a flock of birds almost before they are aware of the presence of the hunter. Is it any wonder that game is diminishing in numbers? The wonder is that there is any left.

BOY SCOUT CO-OPERATION.

Arrangements have been completed whereby boy scouts in this state will take an active part in wild life conservation and act as aids to the Fish and Game Commission. The following statement was recently sent every scout master in California:

The boy scout is in a position to aid materially in the enforcement of fish and game laws and in the care and conservation of wild life. On the other hand, work of this kind not only makes a scout a better citizen but it prepares him for the test for the merit badge in conservation, requirements Nos. 2, 4, and 6 specifying particularly this kind of work. Co-operation by boy scouts in the conservation of wild life in this state is therefore sought by the California Fish and Game Commission.

Credit will be given boy scouts for the following types of work:

1. The dissemination of knowledge on the fish and game laws, the work of the California Fish and Game Commission, and on wild life conservation. (It would be of great aid to the Commission if boy scouts would always take the opportunity to inform campers, hunters, and others with whom they come in contact, of the fish and game laws, warn them of their liability for violation of these laws, and report all violations to the nearest game warden.)

2. The finding and reporting of wild game which has been injured or destroyed in numbers, either through natural or artificial means.

3. The systematic feeding of game during severe winters, or the encouragement of wild birds through feeding, the planting of cover, or the building of nest boxes.

4. The taking of a census of any one game species in a restricted area.

5. The destruction of predacious animals injurious to wild life or the destruction of that worst of bird pests, the European house sparrow, usually called English sparrow.

In return for co-operation, the Commission will award a prize (or prizes if necessary) of a pair of golden pheasants to the boy scout who does the most co-operative work. Scouts wishing to qualify for this prize should report regularly on the work accomplished through their Scout Master to Dr. H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California. A copy of the state fish and game laws is being sent you and other literature is available on request. If sufficient interest is shown in fish and game co-operative work, a merit badge will be offered by the Commission.

FISH AND GAME LECTURES GIVEN TO FORESTRY STUDENTS.

For the second time the Bureau of Education, Publicity, and Research of the California Fish and Game Commission has co-operated with the Forestry Department of the University of California by giving a series of lectures on fish and game. This year these lectures were given before a class in general forestry in which there were about 350 enrolled students. The following were the subjects and the speakers:

The geographical distribution of plants and animals in California

-----Dr. J. Grinnell.

Game and nongame birds of California-----Dr. H. C. Bryant

The economic value of birds.-----

-----Dr. H. C. Bryant.

Game and fur-bearing mammals of California-----Dr. H. C. Bryant.

Mammals in their economic relations

-----Mr. T. I. Storer.

The food and game fishes of California-----*Mr. N. B. Scofield.*
 The past, present and future of game in California-----*Dr. H. C. Bryant.*
 The national forests and wild life-----*Dr. H. C. Bryant.*
 Methods of game conservation-----*Dr. H. C. Bryant.*

WHY ANTELOPE DO NOT INCREASE.

The antelope is probably one of the game mammals which is so nearly extirpated that it will never again take a place among those animals hunted for food or sport. One of the fundamental reasons



Fig. 51. Deputies and assistants of San Francisco office attend lecture on conservation at University of California.

These lectures were designed to furnish a working knowledge of the common birds and mammals of the state with particular reference to important game species and to the problem of their conservation. The lectures were open to the general public and attracted many outsiders, and the last of the series was attended by ten deputies of the Fish and Game Commission (see Fig. 53).

FISH AND GAME EXHIBIT AT CHICO FAIR.

The Fish and Game Commission installed an exhibit at the fair held at Chico the last week in May. Ducks, pheasants and quail from the State Game Farm at Hayward were on display and aquaria contained black bass, blue-gill perch and catfish from the Sacramento River, many salmon fry, and rainbow, eastern brook, and Loch Leven trout. Methods used in hatching and rearing rainbow trout were demonstrated in a small hatchery. The publications of the commission were also prominently displayed. The exhibit proved to be one of the most attractive at the fair.

why antelope are decreasing rapidly in this state at the present time is that certain persons, either with malicious intent or because of lack of knowledge, take a toll from the small herds still existing. As evidence we call attention to the fact that Deputy G. W. Court-right recently reported that a dead male antelope had been found near Alturas, Modoc County, which had been shot by an unknown person. The animal was discovered by D. B. Henks, a government hunter. Evidence that it had been shot but a short time is shown by the fact that it was donated to a county hospital for food. Until people more carefully obey the state game laws there is little likelihood that antelope will increase in our state.

SEA LIONS TRIED AS CARP-KILLERS.

Under permit from Commissioner Connell, Mr. Ira Eaton, of Santa Barbara, procured four adult and two baby sea lions in the Santa Barbara Channel. These were released in Guadalupe Lake on January 27, 1916. It was hoped that the sea lions would cause the destruction

of carp and thus better fishing conditions. On February 7, 1916, the two baby sea lions were killed by Italians living in the near vicinity, and about the same time the other four sea lions disappeared. It is supposed that they went to the ocean. Whether or not the sea lions destroyed large numbers of carp, as was expected, has not been ascertained.

THE SCIENTIFIC COLLECTOR.

The work being accomplished by the holder of a scientific collecting permit is not appreciated by many people of this state. Instead of encouraging the very work which brings the best returns so far as knowledge of bird life is concerned, there is a constant tendency to criticize and curtail this sort of work. No enduring facts regarding the status and habits of wild life can be obtained without the collection of specimens. The most dependable and recognized record of occurrence is always based on a bird in the hand, or, in other words, the scientific specimen.

The following defense of the scientific collector by Mr. Frank M. Chapman, curator of birds in the American Museum of Natural History, appeared in a recent review:

"The editor, Mr. John Dryden Kuser, writes at length on the ethics of bird protection. He admits the right of the sportsman to kill birds for pleasure under 'a reasonable regulation of killing, so that it may be kept down to a basis where the game continues to be preserved and is not decreased,' but deplors the collecting of birds by amateurs for preservation and study. But has not the student equal rights with the sportsman and, pleasure aside, is it not more defensible to shoot a bird for the cabinet than for the table? Furthermore, since the student takes his toll from the entire avifauna rather than a very limited part of it, and his wants, once filled, are not recurrent with the opening of every shooting season, why is he not less destructive than the sportsman? We know of no instance in this country where the numbers of a species have been appreciably affected by purely amateur collecting; and where such collecting is done with a definite end in view, and not merely for the purpose of acquisition, it should be permitted by law. Indiscriminate collecting should be discouraged, not so much because of the birds taken—they will be preserved, not destroyed—but because, in the greater part of our

country, it is a waste of time on the part of the collector. He can employ his opportunities for field work to much better advantage in studying birds rather than in shooting them."

Mr. P. A. Taverner of the Canadian Geological Survey takes a similar view of the scientific collector in the following:

"The fear that the legitimate collector will deplete our bird life is groundless. Even were the number of our collectors increased many times and stimulated to greatly increased energy they would have a negligible effect. Large collections are sometimes pointed to as causes of a supposed reduction in bird life, but all the collections in North America, the results of fifty years' industrious work, would not nearly equal the destruction caused in one year by millinery plumage hunters. When we consider the constant, widespread persecution and the number of widely distributed sportsmen it has taken to reduce our game birds, it is obvious that a few scattered collectors can have little, if any, influence upon the bird population."

Of course, the collector must be reliable, for he is granted a privilege with the understanding that he is to benefit society by increasing scientific knowledge. He is, therefore, expected to preserve properly and care for each specimen and in the end see that his collection is so disposed that it will be of most service to the state.

SUGGESTIONS FOR ORNITHOLOGICAL WORK.

Many people interested in bird life are anxious to make a study that will be worth while. An outline which can be followed by both the amateur and the trained ornithologist, and one which will lead to a comprehensive knowledge of the life history of a bird, is given herewith. This valuable outline appeared in an article by P. A. Taverner, of the Canadian Geological Survey, entitled "Suggestions for ornithological work in Canada" (*Ottawa Naturalist*, vol. 29, April, May, 1915, pp. 14-18, 21-28).

"Ornithology can be approached and studied from various sides and by individuals of many different tastes and inclinations. For the general nature lover, interested in birds from a poetic or esthetic standpoint, the study of life-histories offers a most attractive field. Careful watching and observing of feathered friends in their secluded haunts, bloodlessly stalking them with

camera and note or sketch-book and divining the hidden secrets of their lives is a pleasure that can be indulged in by all and enjoyed by many. The most common bird of our vicinity is an object worthy of the most careful and painstaking attention. The wren building in the improvised nesting box in the garden, the song sparrow of the near-by thicket are both awaiting a careful record of the story of their daily lives. The amount of original, valuable and interesting information that can be gathered from such home-like sources is almost infinite and unexpected surprises will almost daily

ment produce a periodical desire to migrate

"Which individuals come or leave first, male or female, young or old?

"Are they mated when they arrive or do they select mates after arrival?

"Are there any courtship ceremonies?

"What characters seem to determine sexual selection? Vigor? Beauty? Song?

"Do the same individuals return year after year to the same localities, and do they mate together annually?

"How wide is the local range of the individual? Do they keep close to this home area or wander widely?



Fig. 52. Mallard duck on nest at State Game Farm, May, 1916. More than 20 mallards have nested at the farm during the past spring.

repay the close observer. To those whose time and opportunities are limited such birds about home are fruitful. By those with more leisure, greater ambition or ampler opportunities, work farther afield may be pursued and species less commonplace can be studied. In fact there is work in this line for everybody of widely divergent taste and situation and even city parks and backyard gardens will amply repay attention.

"As a suggestion for investigation, the following outline of problems to be solved may be followed. It is merely suggestive and can be enlarged indefinitely.

"Is the species a resident or a migrant?

"When does it arrive and leave?

"What are the determining influences upon its migrations—food supply, weather, or does physiological develop-

"When, where, and how do they nest?

"Which sex chooses the site?

"Which sex builds the nest and how much and in what way do they aid each other?

"What seem to be the qualities that they look for in selecting a nesting site?

"Do they work on the construction throughout the day or only at regular intervals?

"What is the technic of nest building?

"Is the technic the result of instinct, experience or memory, and does it improve with experience?

"Are all individuals of the species equally expert in nest building?

"How far can they adjust nest to new materials, situations or conditions?

"Is there any change in the routine habits before, during or after nest building?

"Are the eggs deposited immediately after the nest is finished?

"What is the incubation period?

"How many eggs are laid and when, how often, what is a normal set?

"Does the egg laying seem under the conscious control of the individual?

"What determines the number of eggs—the size of the nest, the judgment, age or vigor of individual?

"How are the eggs brooded, by which sex? Do they divide the labor? Are the feathers removed from the abdomen of the brooding bird consciously or do they wear off by friction with the eggs? What is the incubation temperature? How often are the eggs turned by the parent?

"How are the eggs protected during exceptionally inclement weather?

ATTRACTING BIRDS.

Bird lovers throughout the land are seeking ways and means of increasing the number of birds and of attracting them to the vicinity of homes. While the basis for this movement is in part esthetic, to no small degree such efforts are based on a growing appreciation of the usefulness of birds as insect destroyers. The increase of interest in wild birds throughout the United States during the past decade has been phenomenal, and organizations having for their chief object the care and protection of birds are numbered by hundreds, if not thousands. Civic leagues and women's clubs have been especially active in attempts to attract birds to city parks and suburbs, with a view to bringing wild life to the doors of those denied the privilege of knowing it in wilder districts. Two publications issued during the year designed to aid and advance this movement—"Bird Houses and How to Build Them" and "How to Attract Birds in Northeastern United States"—constitute manuals on the means of attracting birds and fill a widespread and continually growing demand. The bulletin discussing methods of attracting birds is the first of a series planned to cover all sections of the United States. Special attention is given to the kinds of fruit-bearing shrubs and trees important as furnishing food for birds.—*Report of Chief of Bureau of Biological Survey, 1915, p. 6.*

THE DOMESTIC CAT.

Mr. Edward Howe Forbush, State Ornithologist of Massachusetts, has just published a bulletin of 112 pages (State Bd. of Agric., Economic Biology Bull. No. 2) dealing with the cat as a bird killer, mouser, and destroyer of wild life, and with the means at hand of utilizing and controlling it. After a discussion of the history and habits of the cat much evidence is adduced to prove that it is an active and intelligent bird catcher. Not only does the cat destroy song birds, but also many game birds, such as ruffed grouse, pheasants, partridges, snipe and woodcock. Evidence as to the value of the cat as a destroyer of rats and mice and other vermin shows that its utility in this respect is overrated. The bulletin ends with a discussion of the cat as a disseminator of disease, in which the statement is made that reports from correspondents apparently show that seventeen diseases are disseminated by cats, chief of which are smallpox, scarlet fever, ringworm, and serious infections resulting from the bites and scratches of a cat.

As a means of controlling the cat it is suggested that ownerless cats should be eliminated and owned cats confined like other domestic animals or limited in their movements to buildings or enclosures of their owners, and also that cats be licensed.

"The claims of the cat to a place in our domestic life rest primarily on the fact that it is supposed to do for us, with little conscious effort on our part, the onerous, petty and disagreeable task of destroying small rodents which for centuries have elected to fasten themselves as parasites on civilization. Inasmuch as the creature fails in this, in so far as it destroys other more useful or nobler forms of life, in such measure it becomes an evil and a pest. It will become an influence for good or ill according as we mould it, restrain it and limit its activities. It is our duty to check, with a firm hand, its undue increase in domestication, and to eliminate the vagrant or feral cat as we would a wolf."

THE BREEDING AND SHOOTING OF THE AMERICAN PHEASANT.

A comprehensive book on the breeding and shooting of the American pheasant has been published under the authorship of Mr. E. A. Quarles, Director of the Department of Game Breeding and Preserving of the American Game Protective Association. This work, which was originally intended as a pamphlet on the breeding of the ring-necked pheasant, was finally enlarged to a book of 136 pages, illustrated with 50 half-tones. In the preface emphasis is placed upon the fact that overflow from club and private preserves invariably results in the stocking of public covers in the neighborhood, so that the organization of clubs for pheasant shooting is of considerable value. Mr. Quarles also advocates, as does the Commission on Fisheries and Game of Massachusetts, encouraging the small breeder rather than wholesale production, since the number of persons who can rear pheasants by the thousands is limited compared with those who are able to rear a small number.

Full directions are given as to how ring-necked pheasants may be bred in captivity and how the young may be successfully reared. A chapter then follows on disease and its prevention and one on combating vermin. Other chapters deal with the rearing of fancy breeds of pheasants, the marketing of the pheasant, the use of pheasants for sport, and how a pheasant is prepared for the table.

To pheasant breeders throughout the United States this work will form an important handbook, for it is without doubt the most comprehensive book yet issued on the subject. It can be obtained, bound in cloth, for thirty-five cents by addressing the American Game Protective Association, 233 Broadway, New York City. This book, in connection with the pamphlets cited previously in these pages (Volume 1, pages 225-226) will furnish all the information necessary to the person who contemplates breeding game in captivity.

A GREAT WORK ON PHEASANTS.

The pheasants of all the world are to be glorified in what is considered the finest and costliest publication on a group of

birds ever prepared. The first volume is to appear this year, according to the announcement made at the annual meeting of the board of managers of the New York Zoological Society, which has the work in charge. The price will be \$250 for a set of four volumes, and the edition will be limited to 500 sets. The returns from sales will cover only a fraction of publication cost. Colonel Anthony R. Kuser, of New Jersey, a member of the executive committee, contributed \$100,000 to defray the expense of gathering the material and preparing the elaborate color plates and publishing the work. He stands ready to make good any deficit.

Colonel Kuser is an enthusiastic pheasant breeder, and on his estate near Bernardsville, N. J., has many rare fowls, gathered from all quarters of the globe. The material for this remarkable work has been assembled in the last four years by C. William Beebe, the Zoological Society's curator of birds. Specimens were obtained by expeditions into the Orient—India, Ceylon, the Malay Peninsula, Borneo, Siam, and China, and many other places far from the beaten tracks. The illustrations in color were made by English artists, who excel in that field. The plates, made in London, have been praised for their artistic beauty as well as their scientific accuracy.—*American Game Protective Association Bulletin*, February 15, 1916.

TO THE SPORTSMEN OF CALIFORNIA.

Do you know that there is more typhoid fever contracted from outings in the great out-of-doors than in every-day living?

Do you know that at least 4 per cent of those who recover from typhoid fever retain the germs within their bodies for long periods, sometimes through life, though apparently in good health, and thus are "carriers" of the disease?

Do you know that the body wastes from such a person, if deposited in the stream from which you drink, even many miles upstream, may contain enough virile typhoid germs to pollute a stream as large as the Truckee River to such an extent that every glassful will contain at least one typhoid bacillus?

Will you, therefore, make it your particular business to help prevent pollution

of California's streams by repairing for the purpose of waste ejection to a spot so removed from the stream that by no chance can the refuse flow or be flushed into the stream? You can render a great service to the people of the state if you observe this simple rule.

For your own health it is better to carry good drinking water than to drink from any stream whose watershed is in-

habited. If it is necessary to drink such water, first boil it.

And for the sake of preserving the beauty of the mountains will you:

LEAVE YOUR CAMP AS YOU WOULD LIKE TO FIND IT. BURN OR BURY ALL REFUSE. KEEP THE PLEASURE GROUNDS OF AMERICA CLEAN.

CALIFORNIA STATE BOARD OF HEALTH.

HATCHERY AND FISHERY NOTES.

OPERATIONS OF THE DEPARTMENT OF FISH CULTURE.

The egg collecting season for trout is practically over for this season. The take of eggs of the different varieties is as follows:

| | |
|---------------------|------------|
| Steelhead trout | 6,100,000 |
| Rainbow trout | 2,500,000 |
| Loch Leven trout | 1,725,000 |
| Eastern brook trout | 2,275,000 |
| German brown trout | 90,000 |
| Black spotted trout | 3,325,000 |
| Total | 16,015,000 |

Owing to severe weather conditions on the Klamath River, the take of rainbow eggs will be considerably less than last season. The extremely high water during the early part of the spawning season interfered with the run of fish into the streams where the egg collecting stations are located, and later in the season the long continued cold, clear weather caused the trout to remain in the river and not ascend the spawning streams tributary to the main river as they usually do in normal seasons when the warm rains cause the trout to seek their spawning beds far up the streams.

Owing to the long continued drought on the coast streams the take of steelhead eggs will fall a little short of last season, but as the streams of California were so heavily stocked last season, we have ample fry on hand to give the streams a liberal supply. The applicants in California receive more fish in proportion to the size of the streams than in any other state in the Union.

Next season the Kearsage Hatchery and the Rac Lake egg collecting stations will be in full operation, and we expect to add several million more eggs to the already large annual supply. Several

new stations are being planned by the Department of Fish Culture, to be ready for next year's work. Particular attention will be given to the propagation of the rainbow trout for the Sierra streams and an increase of steelhead for the coast waters.

The Fort Seward Hatchery was completed during the fore part of April, and on April 19th the first shipment of steelhead trout eggs was put in the building. At the present time there are one million steelhead eggs at this station and we are contemplating shipping a few more in the near future.

The distribution of salmon fry was finished on May 1st. The total number distributed was as follows:

| | |
|---|-----------|
| Klamath River and tributaries | 6,863,000 |
| Sacramento River tributaries near Sisson Hatchery | 8,078,000 |

Three million salmon fry will be held in the ponds at Sisson to be reared and distributed in the Klamath and Sacramento rivers during the fall, before the flood season in the rivers. One hundred thousand salmon fry will be planted during the season in the Ventura River.—W. H. SHIBLEY.

GOOSE-NECK BARNACLES.

One of the crustaceans which has heretofore been given very little, if any, credit for its excellent food value, is the goose-neck barnacle. There are probably a great many people who know these little animals only as peculiar objects commonly seen sticking on the rocks along the rocky portions of the coast, and never once realize that they are very fine to eat. This species of barnacle, when properly prepared, is found to taste very

much like lobster and is equally as good to eat. It has recently become commercially valuable, and many are being shipped from Monterey each month to San Francisco markets.

They are prepared as follows: Take barnacle in shell and wash thoroughly clean with small brush, then put in colander to dry. Boil in strong salt water until the barnacles shrink free from the shell, and then remove the heavy

Sciences, and of fresh and salt water fish for Stanford University. He will devote especial attention to the little explored coast between Monterey and San Luis Obispo and to a study of the transition forms of marine fishes in the neighborhood of Point Conception.

Mr. Hubbs will also do some special work for the California Fish and Game Commission, in relation to the distribution of food fishes and edible mollusks.

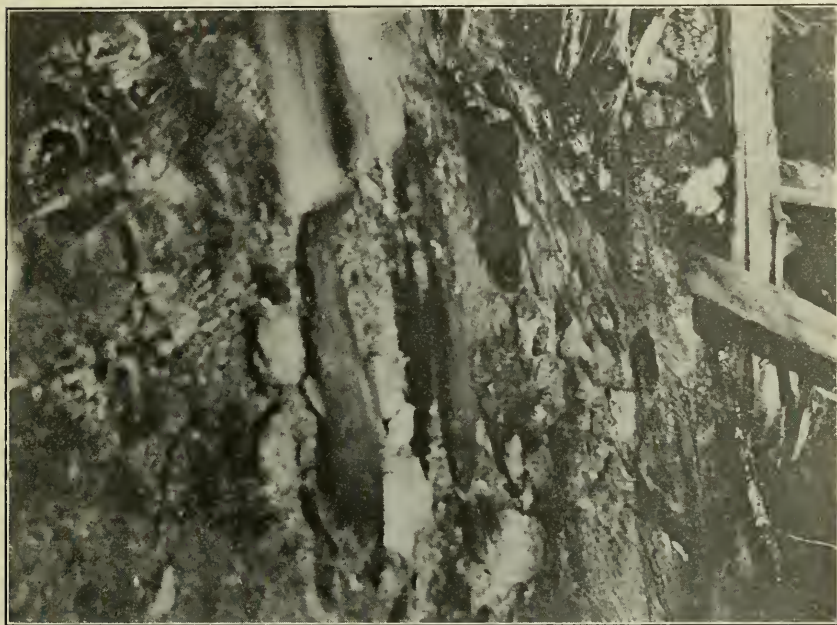


Fig. 53. Trout spawning. The female can be seen at the left digging up the sand preparatory to depositing eggs. The male is shown at the right. Photograph by J. H. Gyger, taken on Orchard Creek, San Bernardino Mountains, April 25, 1916.

skin from the necks. The barnacles may then be prepared as salad or in various other ways.

To make "barnacle *brasée*," season with butter, a little parsley and a pinch of garlic; cover and steam for a few minutes, then add lime or lemon juice and serve on hot plate.

DISTRIBUTION OF FOOD FISHES AND MOLLUSKS TO BE STUDIED.

Carl L. Hubbs, of Stanford University, is devoting the summer to a biological survey of the California coast from Monterey to the Mexican line. He will make collections of the lower forms of marine animals for the California Academy of

FLOUNDERS EAT CLAM NECKS.

Mr. M. L. Clark, on being informed by the Chinese clam diggers on Tomales Bay that the California flounder puts in its time eating the necks off the soft-shell mud clams, decided to investigate for himself. He captured several in a beach seine and found them gorged with clam necks. The Chinamen explained that if only the tip of the neck is bitten off the clam does not die, but if it happens to be bitten a second time it can not recover. Thus is added another to the list of the clam's enemies on which the sting-ray and the wild duck have respectively held first and second place.

SHAD TO BE PROPAGATED IN CALIFORNIA.

Owing to increased interest in the shad as a food fish attempts will this year be made to propagate this fish artificially. The movements of the spawning fish are being carefully studied, and an experimental station has been established on the Feather River near Yuba City. Here an attempt will be made to collect shad eggs for shipment to Massachusetts and Connecticut, and a number of eggs will be hatched and the fish reared for planting in California streams. If the experi-

ment is a success, it is planned to propagate shad on an extensive scale. It is hoped that by this means the shad run will be increased and a depletion, such as has taken place in eastern states, will be avoided.—W. H. SHEBLEY.

coast than on the other and that we are sending the eggs back.

On page 109 (California Fish and Game, Vol. 2), I was "The American bird protector" in question. An old pirate died in England leaving the boast that he had in his lifetime trapped 400,000 skylarks and sold them mostly in the London market for a penny apiece. I noticed that the markets in Vienna, Genoa, and the South of France had great numbers of thrushes, bullfinches and other singing birds. I made a protest to Professor Paul Sarrazin at Basel, the



Fig. 54. Fishermen's wharf at San Pedro, Los Angeles County, California.

ment is a success, it is planned to propagate shad on an extensive scale. It is hoped that by this means the shad run will be increased and a depletion, such as has taken place in eastern states, will be avoided.—W. H. SHEBLEY.

THE FIRST SHAD TAKEN IN THE COLUMBIA.

I had the honor in 1880 to secure the first shad taken in the Columbia River, at Astoria. I sent it to the Smithsonian Institution. It is interesting to know that there are now more shad on this

chairman of our International Wild Life Protection Committee. He said that strenuous laws had been passed in Switzerland, but in the Italian canton Ticino they had never been able to get them enforced. It is very difficult to bring the Mediterranean people to conceive that the song birds in the winter are their guests and that they have a value to the world far greater than that of the little lump of food which each one can produce. I suppose that nearly all of the people arrested for killing song birds are those who have inherited this evil habit.—DAVID STARR JORDAN.

SALMON TO BE TAGGED IN MONTEREY BAY.

Salmon appear in large numbers in Monterey Bay one or two months before the summer or fall run appears in the Sacramento and San Joaquin rivers, and it has always been believed that these salmon in Monterey Bay are Sacramento and San Joaquin River salmon on their way to these rivers to spawn. Each year the fishermen who have had experience on the northern rivers claim that they can

Each tag is stamped with a serial number. The tags are made of silver because this metal best withstands the action of the sea water. We look forward with a great deal of interest to the results of this experiment.

Salmon are taken in large numbers in the sea near Fort Bragg, Mendocino County, and the Commission expects to conduct similar tagging experiments at that place.



Fig. 55. Rock cod fishermen, at San Francisco, baiting and coiling their lines in baskets.

distinguish Eel River salmon, Klamath River salmon, and even Columbia River salmon among those caught in Monterey Bay. For the purpose of determining whether there are salmon other than Sacramento and San Joaquin salmon in the bay, the Fish and Game Commission has undertaken to tag a number of these fish and see if they are recaptured in other rivers than the Sacramento and San Joaquin. The quinnat salmon does not enter any of the streams to the south of Monterey Bay, but we know that they move down the coast often as far as Santa Barbara. Since the salmon travels this distance from the parent stream, it would not be very remarkable to find Columbia River salmon in Monterey Bay. The tags, which are very light, will be wired to the dorsal fin.

FISH CANNERY STATISTICS.

The following table gives the number of cases of fish canned in California in 1915:

| Kind | 1-lb. cans | $\frac{3}{4}$ -lb. cans | $\frac{1}{2}$ -lb. cans |
|---------------|------------|-------------------------|-------------------------|
| Tuna----- | 136,046 | 172,263 | 51,977 |
| Sardines--- | 45,578 | 609 | ----- |
| Salmon----- | 17,143 | 8,230 | ----- |
| Abalone----- | 4,780 | 4,284 | ----- |
| Bonito----- | 117 | 5,477 | ----- |
| Yellowtail--- | 465 | 1,969 | 36 |
| Shad----- | 5,000 | ----- | ----- |
| Shad roe---- | 4,800 | ----- | ----- |
| Rock-cod--- | 12 | 817 | ----- |

The value of cannery buildings and equipment, exclusive of boats and nets, was \$855,000; the number of people employed in canneries during the season was 1,950.

MONTEREY FISHERY NOTES.

During the spring the various packers and fresh fish dealers have shown great activity in the building and installing of new equipment at Monterey and New Monterey. Between 25,000 and 30,000 dollars have been expended by the packers and wholesale dealers in this district. The F. E. Booth Company has expended \$9,000 for the addition to their plant of a new dock, salmon splitting house, and for machinery and equipment. Mr. K. Hovden is just finishing his new plant at New Monterey, which will cost, when completed, nearly \$8,000. Mr. Ben Senderman, of the Pacific Fish Company's plant at New Monterey, has installed new machinery and made changes to the extent of \$4,000. The San Francisco International Fish Company of San Francisco have put up a \$3,000 building on the Monterey city wharf. A. Napoli, a wholesale dealer, has put up a new collecting and shipping house on the city dock at a cost of \$1,000. Vito Bruno, who has been operating in the Western Fish Company's plant, has plans for a \$1,500 fish house on the city wharf. Mr. Joseph Rodriguez, recently from Spain, is building a small plant at New Monterey, where he intends to put out a new product consisting of pickled, pressed sardines in small barrels weighing about 35 pounds each. Mr. Rodriguez is planning to make his own barrels. The plant, when finished, will cost in the neighborhood of \$1,000.

The salmon catch at Monterey is increasing each year and promises this year to be greater than ever before. Up to May 25th, the catch far exceeded the total to the end of June of last year. The catch at the end of May exceeded the entire catch of many former years; and June, July and August have been considered the best months. The largest day's catch was on May 14th, when 85 tons were taken. This, we think, is the record catch for a single day at Monterey. The run is earlier this year than usual, and the fish are therefore smaller. The average size is a little over 12 pounds, but in June and July the fish will run larger, for they will be older and will have had more time to grow. Some very fine, large fish have, however, been taken, and very few fish have weighed less than five pounds.

About 400 fishermen are engaged in fishing for the cannery and fresh markets at Monterey. It is expected that this number will be increased later in the season. The price of the round fish delivered at the dock is four cents per pound. The larger fish are being mild cured; the smaller are canned or sent to the fresh market. The wholesale price of the fish, cleaned, iced and boxed, f. o. b. Monterey, is six and one-half cents per pound.

NEW FISHERY PLANT AT MONTEREY.

Mr. K. Hovden is just finishing his new plant at New Monterey and expects to be ready to operate on sardines and anchovies just as soon as they start to run into the bay in sufficient numbers. This may be at any time about the first of June. Mr. Hovden proposes to utilize anchovies and smaller sardines, which at present are not utilized here to any extent. He says that these small sardines, when intelligently packed, will compete favorably with most European sardines in flavor, quality and price. This company will pack the sardines in the regulation sardine cans, and have the fish look and taste like the European variety. They will make no use of spices and other condiments.

The K. Hovden Company will also put up anchovies in two different styles: as a spiced fish and in a style similar to the Holland sardellen. They claim that their product will equal or excel the anchovies imported from Norway. Mr. Hovden, who has owned and operated plants in Norway, and is an expert in the preparation of fishery products, has done considerable experimenting in preparing sardines and anchovies, as well as several other species of fish, and when he gets his new plant into operation we will expect to see some new and delicious California fishery products.

MENDOCINO FISHERIES.

The salmon run along the Mendocino coast, which has been exploited by local and Sausalito fishermen during the last two or three years, promises to develop to such an extent that, within a few years, it may outrank other industries in Mendocino County. It is possible that the salmon run along the Mendocino coast

during the months of June, July and August will equal the run at Monterey, where there are between 400 and 500 fishermen employed each year to catch salmon for the various packers there established. There should be better harbor equipment at the mouth of the Noyo River. A fisherman's wharf, similar to the piers at Santa Cruz and Capitola, where boats could be hauled up for repairs and during bad weather, should be built. There should also be better facilities for transporting fish from the fishing

FLOODS DESTROY FISH.

The floods of the past rainy season were in some places so severe as to cause great injury to fish in the streams and even to the shellfish in the sea. In Southern California young trout were washed from the streams by the unusually heavy run-off. According to experts from the Scripps Institution for Biological Research, the water in the sea became exceedingly fresh from San Diego to Point Conception. This fresh water could be detected twenty miles from shore and to

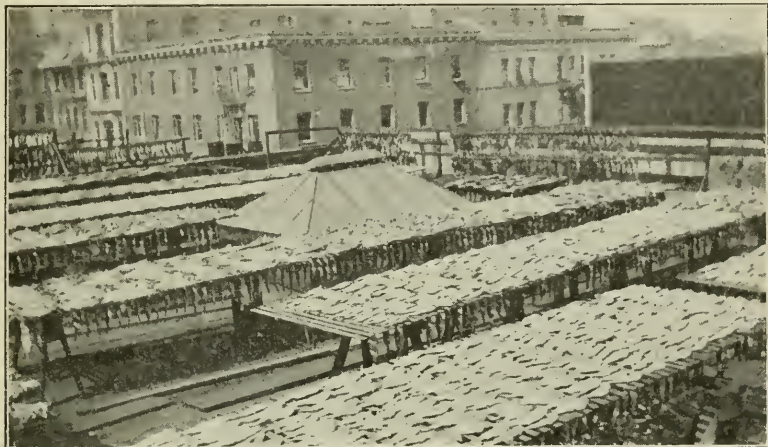


Fig. 56. Roof of Quan Chong Lung Company, San Francisco, showing sole and kingfish. Among these fish were 180 pounds of striped bass, which were confiscated. Photograph by J. W. Gallaway, September 30, 1915.

boats to the train at Fort Bragg. If these accommodations for fishermen were available at the Noyo, there would be more fishermen and better boats. Aside from the advantage derived from the commercial fisheries in Mendocino County, better boats and harbor facilities would add to the attractiveness of this vicinity as a boating and pleasure fishing resort.

The rockfish and halibut fisheries along this section of the coast have hardly been touched. This sort of fishing would employ a great many fishermen the year round, with the exception of a few months during the winter.

Abalones and mussels are also abundant along the Mendocino coast and should be utilized. Some of the largest and best food mussels are taken in Mendocino County.

a depth of twenty fathoms near shore. This excess of fresh water killed great numbers of spiny lobsters, destroyed abalones and mussels, and injured the clam beds. Most of the mollusks in Mission Bay were killed and washed to near the entrance, where they have formed a great bar of shells. The effect of the excess of fresh water on the spiny lobster (crawfish) fishery promises to be great, although it appears that most of the older lobsters were able to escape or were better able to stand the fresh water, and only a few were killed.

Heavy rains of the past winter, falling on hills which lack a proper cover, because of heavy cutting, fires, cultivation or over-pasturing, caused rapid surface run-off and erosion. The water carries with it sediment, organic litter, and leaf

mold which is deposited in lakes or in the deeper portions of the streams. Here it decomposes later in the summer, when the streams become low and the temperature of the water becomes higher. This decomposition exhausts the free oxygen of the water, upon which the fish depend, and releases sulphur dioxide gas, which, when excessive, is deadly to fish.

Many of the streams are unusually low for this time of the year, and we can expect the loss of fish in the lakes and ponds and in the lower courses of the streams to be unusually heavy this summer.

BLACK BASS AT SAN DIEGO.

When the Sweetwater dam near San Diego broke during the month of February, the black bass which inhabited the reservoir were carried into the lower end of San Diego Bay by the rushing water. Although the bass are fresh water fish they made themselves at home in the bay, for the water at the time was perfectly fresh. As the stream gradually ceases to flow during this summer, the water in the bay will become more and more salt and those interested in the ways of black bass are speculating on whether these bass will, during this gradual change from fresh to salt water, become accustomed to the sea and continue to live in the bay.

COMMERCIAL FISHERY STATISTICS.

On page 166 will be found a table showing the amounts of fish landed in the state during the first quarter of 1916. These figures vividly point out the value of the fishery products of California. Even though the totals are large, we are only utilizing but a portion of our fishery resources.

SELECTION OF SHELLFISH.

Care should be used in preparing shellfish to discard all those with broken shells and also those which have become too weak to close their shells. Dead or nearly dead shellfish may, through putrefication, develop ptomaines that are poisonous. In no case use a crab leg which has a crushed segment or a lobster with a broken shell. If care is used in selecting only the live and strong shellfish there need be no fear of ptomaine poisoning.

A GOOD SALMON CONSERVATION MEASURE.

Netting of salmon was formerly allowed at any place on the Sacramento River, but the last legislature passed laws which prohibit all netting above Vina; and in the river between Vina and Colusa, which is district 12a, it is not permissible to take salmon with nets between May 15 and December 31. It is believed that this is one of the best salmon conservation measures which has been passed in years. The salmon of the spring run ascend the river much farther than the fish of the fall run and they deposit their eggs in the headwaters where the streams are small and where the eggs or the resulting young are in much less danger of being destroyed by floods. The young which hatch from the eggs of the spring run are nearly all large enough to take good care of themselves before the winter floods arrive. The small streams in which they spend their early life are less subject to flood and the fry are therefore able to remain until they have reached a good size. Theoretically, they should have a better chance to reach the sea and attain maturity than the fry from eggs deposited by the salmon of the fall run. The fall run has been protected for many years by a closed season beginning in September, but not until now has the spring run received any such protection. In no salmon river are nets allowed so far up stream as in the Sacramento. Haul seines are laid out in the deep water in the bends of the upper river and hauled on the bar on the inside of the curve, sweeping the holes clean of salmon. With these nets on every available seining bar from Colusa to Redding, practically taking the fish off the spawning beds, it is a wonder we have any salmon left. These haul seines operate principally on the spring run salmon and are more successful than the nets on the lower river. The spring run has been poor for the last eight years, and this year it has been the poorest yet. With the upper river closed to salmon nets on May 15th (although that date is not early enough), more salmon should now reach the spawning grounds and the spawn-taking station at Baird. We look forward to an increased yield of salmon as a result of this protective measure.

STING-RAYS DESTROYED.

Sting-rays during March and April move into the shallow water of the bays where they remain during the summer. They are especially abundant in Tomales Bay and here cause great damage to the clam and oyster beds. The clam and oyster companies at Bivalve have been

seining the sting-ray in an effort to get rid of them. So far no use is being made of these fish for fertilizer or chicken feed, for they can not be profitably transported to a reduction plant, since the nearest plant is on San Francisco Bay, and \$3.00 a ton is the price usually paid for sting-rays.

CONSERVATION IN OTHER STATES.**A NEW CONSERVATION SOCIETY.**

The National Educators Conservation Society has been organized to promote the active protection and increase of wild life and forests through the professional educators of America. Such noted educators as Elmer E. Brown, President of New York University, John Grier Hibben, President of Princeton University, and George E. Vincent, President of the University of Minnesota, are honorary vice presidents and the active officers and directors are all professional educators. A leaflet just issued gives the purpose of the society as follows:

"The National Educators Conservation Society was founded to train the children of this great country to a realization of the necessity for efficient protection of the wild life and forests of the United States. Through its teachings it aims to develop in the youth of the country such an understanding of the reasons underlying sound conservation laws as will make of these youths when grown to manhood a vital force in the enactment and defense of country-wide laws for the preservation of true sportsmanship and efficient game control.

"In the propagation of its teachings the Association depends upon the citation of laws that have been enacted by wise legislators to the desired end and per contra upon the disastrous effects of laws or lack of laws which through legislative ignorance or indifference permit the destruction and extinction of desirable forms of game.

"The following are the lines of activity in which the society is engaging:

(a) Secure perpetual close seasons for all species of wild life that are threatened with extinction.

(b) Stop all killing of insectivorous birds for food, and all birds for millinery purposes.

(c) Stop the sale of wild game.

(d) Increase the number of game preserves.

(e) Promote laws to prevent unnaturalized aliens from owning or using rifles and shotguns.

(f) Stop all spring and late winter shooting.

(g) Oppose the use of all extra deadly automatic, autoloading and "pump" guns in hunting, and secure the passage of laws against them.

(h) Preserve all forests from wasteful and destructive lumbering and forest fires; and reforest all denuded areas in state and national forests.

(i) Protect all harmless flowering plants threatened with extermination."

SPORTSMEN'S ORGANIZATIONS IN MASSACHUSETTS.

At the present time there are about 140 sportsmen's associations in the state of Massachusetts, running in membership from 20 to 1,800. These associations are not only factors in assisting in the proper distribution of the stock which the Fish and Game Commission is able to supply, but they serve as clearing houses for ideas and for crystalizing local sentiment on fish and game matters. They have great educational value and are more and more assisting in the solution of the problems which confront the landowner on the one hand and the sportsman on the other. Through these associations the rights of the landowner are becoming more and more recognized, and a spirit of co-operation is developing which will eventually result in the elimination, or, in any event, in the control of the hunter or fisherman who ignores the property rights of the man who owns the land.

THE RING-NECKED PHEASANT IN UTAH.

The ring-necked pheasant is increasing in Utah. From an original plant of fifty the birds have increased to such an extent that about five thousand are now to be found in Utah County alone. Careful protection has been given the birds, the fines ranging from seventy-five to one hundred twenty-five dollars for the killing of a single bird.—E. C. BOUCHER.

BIRD SANCTUARIES IN ILLINOIS.

According to the Game and Fish Commission of Illinois, the system of game reservations and non-game bird sanctuaries adopted by the state of Illinois differs in many essential features from the plans for game conservation and propagation of other states. The Illinois plan keeps close to nature and avoids as far as possible expensive artificiality. Instead of a few large tracts of land maintained at great cost, Illinois will have many small tracts of leased land that may be successfully maintained at a mere nominal cost. According to plans already made it is expected that Illinois will have about one hundred game reservations and non-game bird sanctuaries that may be maintained for about five thousand dollars a year—less than one-half of the cost of maintaining a single game farm of any considerable size.

The Illinois plan is to lease a tract of land of from one thousand to five thousand acres, paying for each parcel that goes to make up the tract, one dollar per year. On each reservation something like five acres of land is planted in wheat, barley, buckwheat, or other grain which grows to a similar height. In these patches there is planted some sorghum or other grain producing vegetation that grows above the snow level. This grain, always planted close to cover, is left standing so that the birds may feed in cover. When the short-growing grain is covered with snow the tall-standing vegetation will furnish food. The price paid for planting the grain patches is about five dollars per acre.

Game birds suffer and die during short periods of severe winter weather, when the ground and natural food is covered with snow. By providing food that may be had from the tall-growing grain during these severe winter periods, the birds are saved.

The plan further contemplates the construction of shelters made from brush. Into these brush heaps the birds can go in severe weather and find protection. Some gravel and sand is placed within the brush heaps for use when the ground is covered with snow.

Suitable signs are put around the reservation warning all persons against trespassing with dog or gun.

PENNSYLVANIA PAYS BOUNTIES ON PREDATORY ANIMALS.

A new bounty law went into effect in Pennsylvania April 15, 1915. Under this new act, which supplants an older one of July 25, 1913, claims are much smaller. The fund from which bounties are paid is created through the operation of the resident hunters' license act. Statistics showing the claims allowed are of interest. Since the law was put into effect a larger and larger number of bounties have been paid. During January bounties were paid on 221 wildcats, 1,030 gray foxes, 1,299 red foxes, 841 minks, 5,586 weasels, representing an outlay of \$12,411. We wonder whether the game saved has been proportionate to this expenditure.

THE TURKEY A GAME BIRD IN PENNSYLVANIA.

IN THE OPEN (January, 1916) is authority for the statement that 3,000 wild turkeys were killed in Pennsylvania during the last open season. Up to three years ago turkeys had become so scarce that a close season was declared, and this last year was the first time the season had been opened since 1912. The birds are still very scarce in many of the counties and without doubt turkey shooting will be limited to but a few counties during the coming season, since many of the counties will take advantage of the law which permits the closing of the season by petition.

THE EUROPEAN BISON.

The protected area which shelters it [the European bison] is the Bjelowicz forest, government of Grodno, being thus included in the Russian war zone; the animals have suffered in consequence much deprivation and loss. It contains 150 square miles, with only a few settlements; the animals were fed in winter. Prof. Dr. Conwetz, director of the Prussian State Bureau for conservation of natural monuments, who took a trip to investigate the rumored destruction of forest and endangered condition of the herd, has returned after a stay of several days at Helowiez. He reports that the former number of 600 has been reduced

to about 200, largely through the poaching by Russians. Now a strict interdict against killing of the animals has been issued from headquarters of the German Army, and at the same time a forester of rank has been appointed in charge of forest and herd. The herd had been protected by Russia since 1892, a fine of 500 rubels being provided against killing. Elsewhere in Russia the bison is only found in the Caucasus. In Germany a few exist, a small herd of 30 in the fenced game preserve of 46 square miles belonging to the Prince of Pless.—*Staats-Zeitung*, of N. Y., Feb. 20, 1916 (translated by F. M., March 20, 1916.)

PROTECTION FOR THE BEAR IN PENNSYLVANIA.

The state of Pennsylvania has recently enacted a law giving protection to the bear. The bag limit is one bear per year, and the open season is from October 15th to December 15th, thus being properly set at the time when the fur is prime. The law definitely states that a bear can be killed only by using a gun "held in the hands of a hunter," except when "it is attempting injury on a person or personal property." In the latter case, however, an affidavit telling of the exact injury must be filed.

It is interesting to note that bear are still abundant enough in Pennsylvania so that a party of six in 1914 killed fourteen bear on one hunting trip (*Pennsylvania Sportsman*. Jan., 1916).

NEW YORK PREVENTS KILLING OF DOES.

The state of New York has narrowly escaped the disgrace of a return to the slaughter of female deer through the passage of the Kasson bill by the last legislature. Fortunately, Governor Whitman had the courage to veto the bill. The doe killers of the Adirondacks are consequently denouncing the governor. If the bill had been brought up in a fair way it would probably not have passed either house of the legislature, but by certain tactics the sponsors for the bill succeeded in having it railroaded through the senate when it was least expected.

INTERSTATE COMMERCE IN GAME.

During the year (1915) there were reported to the solicitor's office 27 cases of violations of sections 242, 243, and 244 of the criminal code, known as the "Lacey Act," relating to interstate traffic in game. These involved violations of law in the states of Arkansas, Delaware, Indiana, Iowa, Kentucky, Michigan, Mississippi, Missouri, Tennessee, Virginia, West Virginia and Wisconsin.

The cases now pending in court number 37 and those under investigation, 38. In one case pending in Missouri evidence was obtained disclosing a systematic plan to violate the law in shipping ducks to market in the adjoining state of Illinois. The evidence showed not merely a violation of the Lacey Act, but a conspiracy to accomplish the shipment of ducks out of the state, and the shippers were so charged. This is one of the most important cases which has developed under this act, and the first in which evidence of a conspiracy has been obtained. In the event of a conviction the deterrent effects are likely to be far-reaching.

Recent occurrences in Arkansas, one of the most important centers for the shipment of waterfowl in the Mississippi Valley, are likely to curtail very decidedly future shipments of game from the sunken lands in the northeastern corner of the state. The state supreme court has decided that a local law applicable to Mississippi County, under which shipments of waterfowl have hitherto been made, was unconstitutional, and that the state law prohibiting export of game was applicable to the counties generally. At the recent session of the legislature provision was made for the first time for the appointment of a state game commission to enforce state laws.

The state of Illinois has also amended its game law prohibiting sale of game, whether taken in or out of the state, thus closing the important market of Chicago. These changes will greatly facilitate the work of the department in the Mississippi Valley and make much more difficult the evasion of state and federal laws regulating shipment of waterfowl.—*Report of Chief of Bureau of Biological Survey, 1915, pp. 12-13.*

MASSACHUSETTS WILL ISSUE QUARTERLY.

The Massachusetts Commissioners on Fisheries and Game plan to publish, quarterly at least, a bulletin setting forth the work of the Commission, thus keeping the public more closely informed of its activities. The bulletin will give the violations of the fish and game laws, with the name of the violator and the disposition of the case; and in each issue some live topic will be discussed. Every Fish and Game Commission will find it distinctly to its advantage to follow the lead taken by Oregon, California and Minnesota in this respect. The Commission in each of these states publishes a quarterly bulletin with the object outlined above.

UTAH PLANS GAME SANCTUARIES FOR EACH COUNTY.

The Fish and Game Commission of Utah is planning to have a game sanctuary established in every county in the state. The plan which is being put into effect as rapidly as possible will set aside 250,000 to 350,000 acres as permanent retreats for game and nongame birds and mammals. Present state sanctuaries comprise 22,000 acres for birds and animals near Salina and 15,000 acres at the Strawberry project. Ultimately it is hoped to have also sanctuaries in every county, one for birds exclusively, and one for upland birds, game birds and animals.

GAME CONSERVATION IN NEW MEXICO.

The following clever contrast between the real protectionist and the game hog appeared in a recent number of *The Pine Cone*, the official bulletin of the New Mexico Game Protective Association:

"ONCE TO EVERY MAN AND NATION COMES THE MOMENT TO DECIDE."

GAME PROTECTIVE ASSOCIATION OF NEW MEXICO.

1. We stand for vigorous and impartial enforcement of the game and fish laws.
2. We stand for federal control of migratory birds and the prohibition of spring shooting.
3. We stand for a vigorous campaign against predatory animals as a menace to game and livestock.
4. We stand for an adequate system of game refuges.
5. We stand for such an increase in game and fish as will furnish legitimate sport for every citizen.
6. We are opposed in general to the public propagation in New Mexico of foreign species as a substitute for native American game.
7. We are pledged to observe the letter of the law and the spirit of good sportmanship.
8. We are not in politics.
9. We stand behind every warden who does his duty.
10. We offer \$50 reward for information leading to the arrest and conviction of any person killing antelope, mountain sheep, or ptarmigan.

APPLICATION FOR MEMBERSHIP.

-----, N. M.
-----, 1916.

President New Mexico Game Protective Association, Silver City, N. M.

DEAR SIR: I subscribe to the above platform and enclose herewith \$1.00 dues for 1916. Please forward my application to the proper local association and have me enrolled as a member.

(Signature)

ANCIENT ORDER OF GAME HOGS.

1. We stand for vigorous and impartial enforcement of the game laws—*against the other fellow.*
2. We want the lid off on spring shooting, and *devil take the hindmost.*
3. We stand for a vigorous campaign against Game Protective Associations as a menace to our Ancient Order.
4. We stand for an adequate system of game refuges—in *Arizona.*
5. We wouldn't mind seeing an increase in game and fish. *Take us to it!*
6. We should worry about native American game as long as there is *something to shoot.*
7. To observe the letter of the law when you're liable to get caught is the part of good judgment.
8. We are not in politics—while asleep.
9. We stand behind every warden who *does not bother us.*
10. We offer \$50 reward for information as to the whereabouts of any antelope, mountain sheep, or ptarmigan. *We thought we had them all.*

APPLICATION FOR MEMBERSHIP.

-----, N. M.
-----, 1916.

President of the Ancient Order of Game Hogs:

DEAR SIR: The above is my sentiments. I hereby renew my membership for 1916, provided it's free and confidential. These are dangerous times for our Ancient Order!

(Signature)

LIFE HISTORY NOTES.

COYOTE EATS DUCK'S EGGS.

On April 9, 1916, in a pasture one mile from Butte Creek, Sutter County, I was shown a mallard's nest containing ten broken eggs. A herder observed a coyote eating something and on investigating found the ten eggshells. From the photograph (Fig. 57) it can be seen that most of the eggs were broken open longitudinally. Animals nearly always eat eggs in such a way as to



Fig. 57. Nest of mallard duck destroyed by coyote. Photograph by George Neale, taken at Butte Creek, Sutter County, April 2, 1916.

break them lengthwise. The herder located the coyote's den in some large holes in the ground in the near vicinity and then destroyed all the coyotes within by blowing it up with dynamite.—GEORGE NEALE.

THE COLUMBIAN SHARP-TAILED GROUSE IN NORTHEASTERN CALIFORNIA.

The Columbian sharp-tailed grouse (*Pediacetes phasianellus columbianus*) or "prairie chicken," once extremely common in northeastern California, is now extinct, or practically so. Several letters were recently written by the Fish and Game Commission to residents conversant with game conditions in Modoc County in order to find out where and when prairie chickens were last seen. Among the replies are the following:

Mr. W. S. Criss, of Lookout, Modoc County, states that about fifteen years ago, before there were any game laws in California sharp-tailed grouse were very common in his locality. A short time

later but one pair of birds were left on his ranch. This pair raised six young. An attempt was made to protect them but by the following year every one had disappeared. Mr. Claude B. Brown, of the same place, states that, although these birds were once so common that flocks of fifty or more could be seen, they have gradually decreased until they are practically extinct. An unconfirmed rumor is reported by Mr. Brown to the effect that Nora C. Nichols saw two "prairie chickens" on the ranch of William Kramer, about one mile northeast of Lookout, during the fall of 1915. Mr. Charles D. Meissner, Assistant Forest Ranger in the Modoc National Forest, reports that a pair of Columbian sharp-tailed grouse were seen on Timbered Mountain in April or May of last year. Early in April Mr. Meissner saw the cock and hen together and the booming noise made by the cock was heard upon several occasions. Later in the season the hen was seen on two different occasions to tumble off as if wounded and then take flight, which led to the theory that chicks were hidden in the grass. An investigation will be made this spring to determine whether or not sharp-tailed grouse are still present in this section.

Deputy Frank P. Cady, of Susanville, reports that about fifteen years ago there were forty or fifty sharp-tailed grouse at the mouth of Juniper Creek on a ranch owned by Mr. Mackensie, who allowed no shooting on his property. After Mr. Mackensie's death the ranch was rented and shooting was allowed with the result that about ten years ago the prairie chickens disappeared entirely. None has been heard of in the northern part of the state during the last ten years, according to Mr. Cady.—H. C. BRYANT.

WHITE PELICANS FORMERLY NESTED NEAR SACRAMENTO.

Lone Tree Island, about three miles northwest of the city of Sacramento, was formerly the site of a white pelican rookery. The accompanying photographs showing some of the birds and some of the nests were taken June 28, 1910.—GEORGE NEALE.

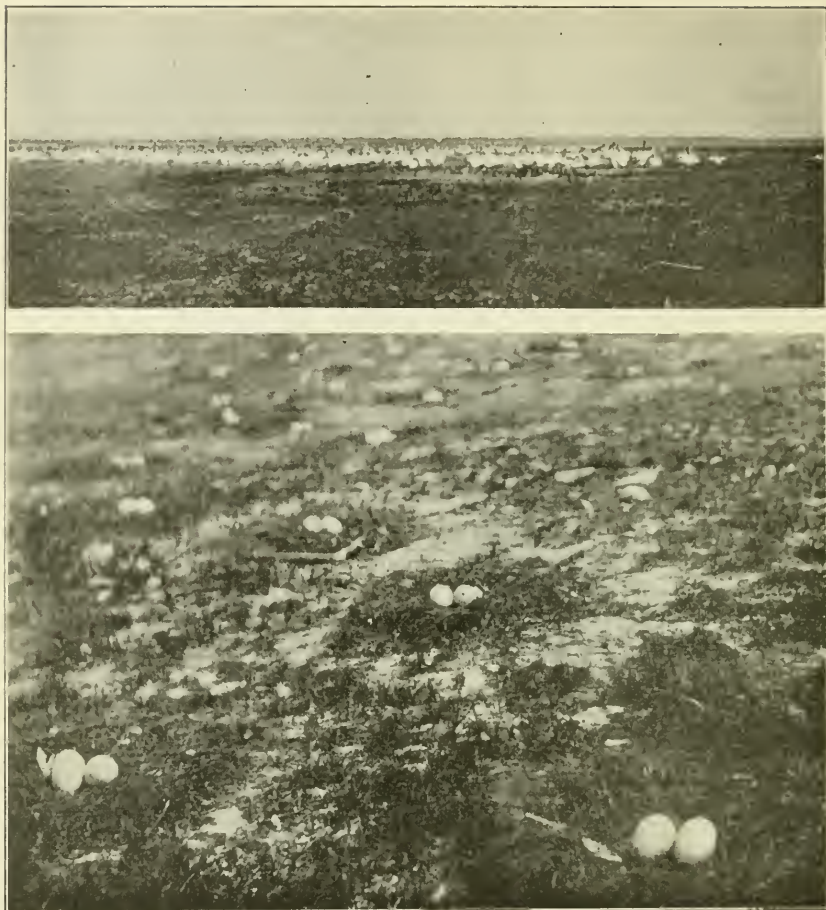


Fig. 58. Nesting colony of white pelicans on Lone Tree Island, three miles northeast of Sacramento. Photograph by George Neale.

ANTELOPE INCREASE IN SISKIYOU COUNTY.

During the winter of 1894 a band of twenty antelope (*Antilocapra americana americana*) were known to exist in eastern Siskiyou County. Since then the herd seems to have increased, due to the protection afforded it. Mr. Davis, former owner of the Mitchell Ranch, near Mount Dome, took great interest in the animals and tried to protect them. He instructed his men to report all violations, and people generally came to regard Mr. Davis as the antelope protector. In spite of this rigid protection there were some who persisted

in hunting the animals, for several heads of antelope which had evidently been killed by hunters have been found south of the Davis ranch.

On March 27, 1915, I counted 72 antelope in one band at the south end of Mount Dome. Mr. Edward Daggett, foreman of the Churchill cattle ranch, counted 42 antelope near the Mitchell Ranch on Willow Creek, Siskiyou County, on March 1, 1916. The animals seem to range in small bands of from 8 to 35. It is my belief that these animals now number at least 150 in this vicinity.—G. W. COURTRIGHT.

PHEASANTS INCREASE ON YERBA BUENA ISLAND IN SAN FRANCISCO BAY.

The pheasants placed on Yerba Buena Island in San Francisco Bay are apparently increasing rapidly. In addition to the ringnecks placed on the island several years ago, a number of silver pheasants were liberated there last year. Captain Phillip Andrews, Commandant of the United States Naval Training Station situated on the island, reports under date of May 16, 1916, that nine or ten broods of pheasant chicks have been seen within the past few weeks. The broods numbered from ten to sixteen and most of them averaged more than ten. The success being attained here is partly due to the excellent protection and care given the birds.—H. C. BRYANT.

MOURNING DOVES BRED IN CAPTIVITY.

A number of years ago while pruning a lemon orchard, I discovered that, in cutting a large limb, I had molested two young, well-feathered mourning doves (*Zenaidura macroura marginella*). I brought the birds home and asked Mrs. Hammond to try to raise them. A soft meal of ground seeds (chicken scratch food), was made, and Mrs. Hammond fed the doves by taking the food between her fingers, and placing it in their bills. This feeding operation lasted about 5 or 6 days, after which the birds began to eat alone. In this manner the birds were successfully reared.

The following season the female bird laid twice and hatched four young. I placed the birds in a cage 10 by 10 by 8

feet high. After two years I had about 40 or 50 doves.

On Hallowe'en two years ago some heartless brute managed to put a dog in the cage and it killed all but three birds. These few, however, have been multiplying ever since, and there are now about twenty birds, including two nests each with two young. I placed a dead lemon tree in the cage for the doves to roost upon and have hung cans filled with straw for nest building, from the top of the cage by wires eighteen inches long. The birds rebuild their nests each time they lay. The nesting season begins in March and continues to the latter part of November, and two broods are reared each season.

Doves become very tame and make interesting pets. On several occasions I have liberated some of the birds. Some would stay near by and others would fly away, but none ever failed to return at sundown.—L. W. HAMMOND.

COURTING OF THE SAGE HEN.

During March, I noted the courting antics of the sage hens (*Centrocercus urophasianus*) in the vicinity of Straw, Modoc County. The male birds gathered on knolls or ridges, and the females kept watch a short distance away. The strutting of the sage hen is much like that of the tame turkey. The tail is spread wide and held vertically, the breast is tilted back and held as high off the ground as possible; the head is held high; then with a bow of the head and an upward motion of the breast the bird makes the "gumpe gumpe" sound.—G. W. COURTWRIGHT.

UNITED STATES FOREST SERVICE CO-OPERATION.

SAGE HENS IN THE MONO NATIONAL FOREST.

Sage hens are becoming abundant in many places, especially along the southern end of the Mono National Forest, from Bridgeport south on the open country. In the past their nesting places were badly disturbed by numerous sheep tramping through the country. At present they find quite good protection by restricted grazing and are consequently increasing.—W. M. MANLY.

BEAVER ON THE INCREASE IN MODOC COUNTY.

There are several colonies of beaver in the northern part of Modoc County. I am informed by parties well acquainted with that section of the country that this valuable animal is on the increase, undoubtedly due to the protective laws in force. In spite of their highly prized fur, there is no game law more respected than that applying to these interesting animals.—WM. S. BROWN.

ALL VENISON SHOULD BE UTILIZED.

The state of Wyoming has a law prohibiting the leaving in the woods of the meat of elk and deer killed. There should be a similar law in California relating to deer meat. All too often a traveler or camper will kill a buck when he knows he can not use or dispose of the meat, simply for the sake of telling that he got a deer, or perhaps in order to secure the horns as a trophy. In some cases a ham or two may be cut out and the balance of the meat allowed to go to waste. This is a shameful waste and should be prohibited by law. It is one of the reasons why local residents feel antagonistic toward the "city sports," for to the local resident the meat represents a money value in his food supply and he makes full utilization of it.—J. D. COFFMAN.

DEER NEED CLOSED SEASON.

District Ranger E. W. Searcy of the Elsinore District makes the following recommendations concerning deer: "That deer be protected absolutely for 5 years. In case the 5-year close season can not be put into effect I earnestly recommend that the boundaries of the Cleveland Game Refuge, District 24, and the Trabuco division of the Cleveland National Forest be made co-extensive. The Forest boundary markers are well known and it would be an easy matter to post a game refuge marker alongside.—S. W. WYNNE.

DEER AND THE DEER LAW IN TRINITY COUNTY.

District Ranger Chamberlain reports that his observations while on field trips this past season would indicate that deer were scarcer in the Stuarts Fork District than ever before: small deer in particular were very scarce. For the lower Trinity District, on the other hand, District Ranger Graham reports small deer more numerous than usual, and that they destroyed the last crop of alfalfa on most of the ranches in the Lower Trinity and New River sections.

For this region the change in the deer season by cutting out the last half of October, has eliminated the best of the season for local residents. It would have been much more preferable to have had the season shortened by postponing its opening until September 1st, and have

allowed it to remain open until October 3d. During August the deer are not in especially good condition, and the meat will not keep well during the hot weather of that month. During October the deer are at their best and the cool weather permits longer use of the meat.—J. D. COFFMAN.

GROUSE IN THE ELDORADO NATIONAL FOREST.

Grouse are disappearing at a rapid rate. Forest officers state the number of grouse seen in the mountains this season is at least 10 per cent lower than the preceding year.

Grouse should be protected by a closed season of not less than five years, and closer supervision by game wardens.—E. L. SCOTT.

THE ANGELES FOREST GAME REFUGE.

The Angeles Forest Game Refuge has worked out admirably, and we have had but one violation where a man living just inside the Refuge shot some quail on his own land; this case is now pending a decision. I find that the Game Refuge is very popular in this section, even among the resort owners, who are the only ones financially affected. I have interviewed practically every resort owner—and there are some 25 within the Refuge—and not one of them has objected to it. The only objection I hear is in not being permitted to bring into the Refuge game shot on the outside. I hope another year the Commission can see its way clear to employ the two men suggested by Mr. DuBois whose duty it will be to check any deer killed on the outside, but which it is necessary to bring through the Refuge in order to get them out.—R. H. CHARLTON.

PECULIAR DEER KILLED IN SANTA BARBARA NATIONAL FOREST.

Antlers of a deer killed several years ago near Cuyama Valley, Santa Barbara County, by Forest Guard Eugene Johnston, of the Santa Barbara National Forest, have been identified as belonging to a species of deer found in the eastern states, by a member of the California Academy of Sciences, San Francisco. No explanation is vouchsafed as to how the deer travelled so far west.

FISHING IN THE ELDORADO NATIONAL FOREST.

Exceptionally fine weather, good roads, and the opening of the fishing season on May 1st lured local and Sacramento anglers to the streams in and adjacent to the Eldorado National Forest, particularly the south fork of the American River and smaller tributary streams. But because of high water, due to melting of the unusually heavy snowfall of last winter, the trout could not be induced to take the fly. By the use of angleworms, however, a few fair catches were made during the first half of the month. Cooler weather, accompanied by light rain, and on May 24th a light fall of snow over the Forest, has precluded activity by anglers.

Many anglers have voiced the sentiment that May 1st is too early to open the trout fishing season in this locality, since spawning is not completed at this date. They suggest May 15th, or even June 1st.

Residents of the Lake Tahoe basin and visiting anglers have expressed the opinion that the high rate of mortality of fish that spawn in the streams tributary to Lake Tahoe is due to the debris—decayed timber and vegetation—found in these streams. This debris is said to harbor the leech, a parasite which attacks the gills of fish. The removal of the debris is suggested as an aid to trout propagation, rather than the present method of frequent restocking with fish fry.

During the winter months, sportsmen predicted an extreme mortality among

wild animals because of the unusually heavy snowfall, but reports to date from areas frequented by deer indicate that unusual mortality did not occur among these animals.

LARGE TROUT TAKEN AT STONY CREEK DAM.

Large catches of trout have been made recently above the Stony Creek diversion dam in the California National Forest. The average size of the fish caught above the dam is very much larger than those taken in other parts of the stream, due probably to the greater protection from natural enemies afforded by the deep water above the dam.

This dam was constructed in 1914 by the United States Reclamation Service for the purpose of diverting the flood waters of Stony Creek to the East Park Reservoir and it makes in itself a reservoir half a mile long by thirty feet deep at the dam.

TRINITY DEER REFUGE.

The establishment of Game District No. 2 was a very desirable step in the conservation of the deer in this region. The forest officers of the Trinity are assisting Deputy Laws as much as possible in the administration of this refuge. It is quite important, however, that the boundaries of this refuge should be completed before the opening of the next hunting season, and for this work Mr. Laws will need money for the employment of temporary labor. The Commission should provide Mr. Laws with funds for this purpose.—J. D. COFFMAN.

REPORTS.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING MARCH 31, 1916.

| Species of fish | Del Norte, Humboldt | Mendocino, Sonoma, Lake | Marlin | Solano, Yolo | Sacramento, San Joaquin | Contra Costa, Alameda | San Francisco, San Mateo | Sanita Cruz | Monterey | San Luis Obispo, Santa Barbara, Ventura | Los Angeles | Orange | San Diego | Other counties | Mexico | Total |
|--------------------------|---------------------|-------------------------|--------|--------------|-------------------------|-----------------------|--------------------------|-------------|----------|---|-------------|--------|-----------|----------------|---------|-----------|
| Albacore | | | | | | | | | | | 55 | | | | | 55 |
| Anchovy | | | | | | | | | 150 | | 4,270 | | | | | 4,420 |
| Barracuda | | | | | | | | | | 3,100 | 506,467 | 43 | 48,190 | | 55,065 | 702,865 |
| Bonito | | | | | | | | | | 1,000 | 2,812 | | 1,975 | | | 5,817 |
| Bocaccio | | | | | | | 6,591 | 1,457 | 22,936 | | | | | | | 31,004 |
| Bluefish | | | | | | | | | | | | | | | | |
| Chillipepper | | | | | | | | 4,865 | 65,350 | | | | | | | |
| Carp | | | | 15,765 | 22,760 | 37,656 | 702 | | | | | | | | | 70,215 |
| Catfish | | 17,082 | | 15,116 | 3,041 | 7,616 | | | | | | | | | | 76,883 |
| Coalfish | | | | | | | | 563 | | | | | | | | 42,885 |
| Cultus cod | 512 | | | | | | 1,8376 | 28,445 | 78,241 | | | | | | | 205,574 |
| Dogfish | | | | | | | 3,109 | | | | 3,119 | | | | 6,219 | |
| Flounder | 10,111 | | 2,699 | | | 279 | 63,355 | 3,935 | | | 2,297 | | | | | 82,673 |
| Halibut (California) | 341 | | | | | | 5,275 | 1,690 | 954 | 5,000 | 521,990 | 5,659 | 925 | | 545,218 | 1,090,652 |
| Hake | | | | | | | 1,170 | | | | 818 | | | | | 1,988 |
| Herring | 3,753 | | 25,326 | | | 61,618 | 1,194,310 | 20 | | | | | | | | 1,290,227 |
| Kingfish | | | | | | | 425 | 27,985 | 13,396 | | 209,940 | | | | | 251,746 |
| Mackerel | | | | | | | | | 3,977 | 3,500 | 129,146 | 190 | 11,517 | | | 148,330 |
| Mullet | | | | | | | | | | | | | | 250 | | |
| Pike (California) | | | | 988 | 2,285 | 2,275 | | | | | | | | | | 5,518 |
| Pompano | | | | | | | 1,677 | 113 | | | 11,019 | | | | | 12,809 |
| Perch | 5,780 | 45 | 31,440 | | 160 | | 4,829 | | 1,988 | | 23,408 | 5 | | | | 67,605 |
| Rock bass | | 6,704 | | | | | | | | | 141,054 | 2,877 | 6,499 | | | 150,430 |
| Rockfish (miscellaneous) | 3,447 | | | | | | 67,368 | 197,696 | 217,270 | 4,500 | 355,235 | 219 | 332,933 | | | 1,197,822 |
| Sole | | 45 | | | | | 988,535 | 2,39,907 | 5,681 | | 1,226 | | 214 | | | 1,199,611 |
| Salmon | | 70 | | 39,327 | 3,870 | 78,739 | 910 | 1,165 | 393,412 | | | | | 5,840 | | 522,663 |
| Smelt | 13,174 | | 10,533 | | | 1,360 | 12,783 | 45 | 3,823 | 7,475 | 43,002 | 4,865 | 10,020 | | | 106,880 |
| Sea bass (white) | | | | | | | 42 | 251 | 661 | 1,000 | 74,547 | | 1,445 | | | 77,946 |
| Sea bass (black) | | | | | | | | | | | 4,060 | | 14,191 | | | 18,251 |
| Sandab | | | | | | | 251,786 | 62,981 | | | 3,597 | 56 | | | | 318,445 |
| Striped bass | | 36 | 3,282 | 91,814 | 1,863 | 85,433 | 22,275 | | 25 | | | | | | | 201,859 |
| Shad | | | | 7,019 | 889 | 66,601 | 3,113 | 362 | 156 | | | | | | | 78,284 |
| Sturgeon | | | | | | | | | | | | | | 136 | | 5,375 |
| Sardine | | | | | | | | | 166,361 | | 20,695 | | | | | 195,129 |
| Skate | | | 8,073 | | | | 46,750 | 150 | | | 1,163 | | | | | 48,063 |

| | | | | | | | | | | | | | |
|-------------------------|--------|--------|---------|--------|---------|-----------|---------|-----------|--------|-----------|--------|---------|-----------|
| Sculpin | | | | | | | | | 1,101 | | | | 1,101 |
| Sea trout | | | | | | | | | | | | | |
| Tom cod | | | | 310 | | 23,114 | | | | | | | 23,518 |
| Trout (lake) | | | | | | | | | | | | | |
| Trout (steelhead) | | | | | | | | | | | | | |
| Turbot | | | | | | | | 150 | | | | | 1,370 |
| Whitebait | | 1,420 | | | | 745 | | | | | | | 6,209 |
| Yellowtail | | 5,444 | | 20 | | | | | | | | | 237,538 |
| Miscellaneous | 2,157 | | 6,488 | 15,278 | 5,484 | 16,582 | 48,458 | 610 | | | | | 107,069 |
| Total fish | 39,225 | 23,982 | 179,664 | 50,146 | 318,783 | 2,879,143 | 589,208 | 1,004,994 | 25,575 | 2,276,353 | 13,953 | 432,242 | 8,657,994 |
| Crustaceans— | | | | | | | | | | | | | |
| Crab (dozen) | 1,969 | 94 | 98½ | | | | 2,409½ | 3,118 | 8,302 | 35,752 | 1,735 | 44,804 | 17,833½ |
| Spiny lobster | | | | | | | | | | | | | 113,653 |
| Shrimp | | | | | | 71,736 | | | | | | | 71,736 |
| Ecrevisse | | | | | | | | | | | | | |
| Mollusks— | | | | | | | | | | | | | |
| Squid | | | | | | | | 24,021 | | 23,607 | | | 49,628 |
| Cuttlefish | | | | | | | | | | | | | 47,361 |
| Clams (Pismo) | | | | | | 41,368 | 4,299 | 1,694 | 43,909 | | | 344 | 46,858 |
| Clams (cockle) | | | | | | | 2,605 | | | 1,200 | 164 | | 27,302 |
| Clams (softshell) | | 25,892 | | | | 46 | | | | | | | 98,910 |
| Clams (mixed) | 20,310 | 8,485 | 43,640 | | 36,859 | 9,926 | | 810 | | 2,522 | 50 | | 25,107 |
| Oysters (shell), number | | 353 | 2,852 | | | 400 | | | | | | | 3,666,045 |
| Abalones | | 972 | | | | 3,662,840 | | | | | | | 96,964 |
| Mussels | 640 | | 345 | | | | 2,240 | 15,654 | 1,404 | | 36 | | 76,558 |
| | | | | | | | 1,170 | | | 16,675 | | | 18,880 |

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

**NUMBER OF DEER KILLED IN VARIOUS COUNTIES DURING THE
OPEN SEASONS 1914-15.**

District No. 1.

| County | 1914 | 1915 |
|-------------|-------|-------|
| Alpine | 39 | 66 |
| Amador | 36 | 43 |
| Butte | 39 | 26 |
| Calaveras | 202 | 111 |
| Del Norte | * | \$225 |
| El Dorado | 300 | 109 |
| Fresno | 151 | 156 |
| Humboldt | 200 | 167 |
| Inyo | 40 | \$131 |
| Kern | 235 | 121 |
| Kings | 14 | 1 |
| Lassen | 89 | 126 |
| Madera | 57 | 34 |
| Mariposa | 53 | 10 |
| Merced | † | * |
| Modoc | 160 | 106 |
| Mono | 152 | 4 |
| Nevada | 143 | 65 |
| Placer | 77 | 87 |
| Plumas | 200 | 93 |
| Sacramento | 30 | * |
| San Joaquin | 8 | * |
| Shasta | 357 | 492 |
| Sierra | 37 | 11 |
| Siskiyou | 575 | 665 |
| Stanislaus | † | 51 |
| Sutter | * | * |
| Tehama | 198 | 164 |
| Trinity | 735 | 543 |
| Tulare | 128 | 223 |
| Tuolumne | 203 | 174 |
| Yuba | 6 | 14 |
| Totals | 4,161 | 4,028 |

District No. 2.

| | | |
|-----------|-------|-------|
| Colusa | 250 | 262 |
| Glenn | 90 | 215 |
| Lake | 161 | 84 |
| Marin | 320 | \$325 |
| Mendocino | 268 | \$500 |
| Solano | 14 | 5 |
| Sonoma | 436 | 360 |
| Yolo | 38 | 127 |
| Napa | 373 | 119 |
| Totals | 1,950 | 1,997 |

District No. 3.

| County | 1914 | 1915 |
|-----------------------|------|---------|
| Alameda | 8 | \$125 |
| Contra Costa | * | † |
| Monterey | 632 | 595 |
| San Benito | 11 | 55 |
| San Francisco | No | hunting |
| San Luis Obispo | 60 | 155 |
| San Mateo | 5 | 55 |
| Santa Clara | 5 | 362 |
| Santa Cruz | 155 | \$132 |
| Totals | 876 | 1,479 |

District No. 4.

| | | |
|----------------------|-----|-----|
| Imperial | * | * |
| Los Angeles | 143 | 95 |
| Orange | 24 | * |
| Riverside | 102 | 55 |
| San Diego | 45 | 44 |
| San Bernardino | 97 | 29 |
| Santa Barbara | 475 | 338 |
| Ventura | * | 172 |
| Totals | 886 | 733 |

Reports Unspecified as to Counties.

| | | |
|-------------------------------------|-------|-------|
| Shasta National Forest | 87 | ----- |
| Lassen National Forest | 13 | ----- |
| California National Forest | 238 | ----- |
| Stanislaus National Forest | 96 | ----- |
| Santa Barbara National Forest | 89 | ----- |
| Sierra National Forest | ----- | 103 |
| Totals | 523 | 106 |
| Total for year 1914 | 8,699 | ----- |
| Total for year 1915 | ----- | 8,343 |

*No record. †Close season. §Estimated.

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

March 1, 1916, to May 31, 1916.

Game.

| | |
|----------------------|------------|
| Deer meat | 184 pounds |
| Deer hides | 27 |
| Quail | 4 |
| Non-game birds | 12 |
| Rabbits | 2 |

Fish.

| | |
|--------------------------|------------|
| Striped bass | 463 pounds |
| Trout | 189 pounds |
| Salmon | 140 pounds |
| Miscellaneous fish | 342 pounds |
| Crabs | 51 |
| Abalones | 973 |
| Pismo clams | 208 |
| Nets and lines | 61 |

Scarches.

| | |
|-----------------------------|----|
| Illegal fish and game | 28 |
|-----------------------------|----|

VIOLATIONS OF THE FISH AND GAME LAWS.

March 1, 1916, to May 31, 1916.

| Offense | Number of arrests | Fines imposed |
|--|----------------------|------------------|
| <i>Game.</i> | | |
| Hunting without license..... | 23 | \$415 00 |
| Deer, close season, killing or possession..... | 18 | 225 00 |
| Female deer, spike bucks, killing or possession..... | 6 | 200 00 |
| Illegal deer hides..... | 5 | 200 00 |
| Nongame birds, killing or possession..... | 4 | 25 00 |
| Cottontail rabbits, close season, killing or possession..... | 2 | 30 00 |
| Ducks, close season, killing or possession..... | 3 | 75 00 |
| Quail, close season, killing or possession..... | 8 | 200 00 |
| Shore birds, close season, killing or possession..... | 1 | 25 00 |
| Total game violations..... | 70 | \$1,395 00 |
| <i>Fish.</i> | | |
| Angling without license..... | 23 | \$520 00 |
| Fishing for profit without license..... | 11 | 210 00 |
| Dealing in fish wholesale without license..... | 1 | 20 00 |
| Trout, close season, taking or possession..... | 25 | 585 00 |
| Trout, excess bag limit, taking or possession..... | 10 | 161 00 |
| Failure to maintain screen in irrigating ditches..... | 1 | 35 00 |
| Pismo clams, underweight, excess bag limit..... | 15 | 180 00 |
| Abalones, undersized, taking or possession..... | 6 | 100 00 |
| Crabs, undersized, taking or possession..... | 4 | 30 00 |
| Black bass, close season, taking or possession..... | 1 | 20 00 |
| Striped bass, underweight, taking or possession..... | 2 | 20 00 |
| Striped bass, shipping from state..... | 5 | |
| Salmon, underweight, sale..... | 2 | 300 00 |
| Young of fish, taking or possession..... | 2 | 50 00 |
| Chicken halibut, underweight, sale..... | 1 | 25 00 |
| Illegal nets..... | 15 | 400 00 |
| Total fish violations..... | 124 | \$2,656 00 |
| Grand total fish and game violations..... | 194 | \$4,051 00 |

FINANCIAL REPORT.

Statement of Expenditures for the Months of February, March, and April, 1916.

| | February | March | April |
|--|-------------|-------------|-------------|
| General administration, salaries, traveling expenses, rentals, supplies, etc. | \$1,925 07 | \$2,184 18 | \$2,240 87 |
| San Francisco district, salaries, traveling expenses, rentals, supplies, etc. | 4,519 04 | 5,469 58 | 5,674 04 |
| Sacramento district, salaries, traveling expenses, rentals, supplies, etc. | 3,531 72 | 3,386 42 | 3,667 78 |
| Los Angeles district, salaries, traveling expenses, rentals, supplies, etc. | 1,705 50 | 1,800 03 | 1,684 71 |
| Fresno district, salaries, traveling expenses, rentals, supplies, etc. | 1,474 19 | * | * |
| Hatchery administration, salaries, traveling expenses, supplies, etc. | 817 21 | 766 09 | 762 19 |
| Fishery research and publicity, salaries, traveling expenses, supplies, etc. | 308 98 | 542 57 | 444 91 |
| Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc. | 349 41 | 382 25 | 316 16 |
| Fish distribution cars (1 and 2) salaries, traveling expenses, rentals, supplies, etc. | | | 88 52 |
| Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc. | 749 76 | 1,034 02 | 1,021 92 |
| Sisson Hatchery, salaries, traveling expenses, supplies, etc. | 1,656 67 | 1,536 71 | 1,577 91 |
| Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc. | 361 71 | 323 98 | 377 00 |
| Tahoe Hatcheries, salaries, traveling expenses, supplies, etc. | 10 00 | 406 44 | 440 91 |
| Price Creek Hatchery, salaries, traveling expenses, supplies, etc. | 43 10 | | |
| Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc. | 299 80 | 660 69 | 581 59 |
| Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc. | 249 47 | 322 86 | 326 69 |
| Bear Valley Hatchery, salaries, traveling expenses, supplies, etc. | | 332 69 | 383 33 |
| Marlett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc. | 17 40 | 15 00 | 15 00 |
| Fort Seward Hatchery, salaries, traveling expenses, supplies, etc. | 82 00 | 1,073 74 | 1,033 68 |
| Inyo County Hatchery, salaries, traveling expenses, supplies, etc. | 99 | 540 93 | 6,631 00 |
| Almanor Station, salaries, traveling expenses, rentals, supplies, etc. | | 59 52 | 264 15 |
| Game farm, salaries, traveling expenses, supplies, etc. | 395 31 | 222 43 | 236 95 |
| Game research and publicity, salaries, traveling expenses, supplies, etc. | 237 52 | 298 01 | 315 57 |
| Prosecutions and allowances | 230 42 | 274 60 | 263 96 |
| Hunting license commissions and refunds | 379 60 | 591 20 | 1,025 90 |
| Anglers' license commissions and refunds | 569 30 | 88 70 | 180 60 |
| Market fishing license commissions and refunds | 2 50 | 17 00 | 140 00 |
| Crawfish and abalone inspection | 200 00 | 200 00 | 100 00 |
| Winter game feeding | 229 63 | | 30 76 |
| Mountain lion bounties | 580 00 | 500 00 | 340 00 |
| Printing and lithographing | 69 37 | 203 97 | 426 28 |
| Claims paid account accidents | | | |
| Totals | \$20,985 67 | \$23,233 61 | \$30,592 38 |

Balances: March 1, 1916, \$103,121.65; April 1, 1916, \$86,029.53; May 1, 1916, \$70,877.80.

*Included in San Francisco and Los Angeles districts.

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CALIFORNIA FISH AND GAME

" CONSERVATION OF WILD LIFE THROUGH EDUCATION "

Volume 2

SAN FRANCISCO, OCTOBER 18, 1916

Number 4

CALIFORNIA CLAMS.

By HAROLD HEATH, Department of Zoology, Stanford University.

Of the various species of clams, mussels and snails inhabiting the rocky headlands, muddy inlets, and sandy beaches of the California coast, no less than fifteen are of prime economic importance and are steadily growing in favor among the people of the state. Unfortunately the demand for such articles of food has outstripped the supply, and several localities once thickly populated with these animals have passed the limit of profitable digging. Even in the most favorable districts the catch is steadily diminishing or is harvested with increasing difficulty.

This condition of affairs has been brought about by several agencies. Intensive digging, occasionally with the aid of plows and harrows, wrought havoc in the past; the indiscriminate taking of clams of any and every size was likewise an important factor; and tremendous storms, such as the one which swept the coasts of the southern third of the state two years ago, were equally destructive. However, those who foresee the total extermination of this class of animals probably claim too much. A scanty population still exists on the abandoned beds, small, scattered groups inhabit isolated beaches, and the shore immediately beyond the low tide mark doubtless supports a goodly number. It is reasonable to believe that, when undisturbed, the young from such sources will gradually migrate and restock the now unproductive districts. Following the custom of the past these replenished areas will then be dug intensively with a resulting period of lean years. Needless to say such a method of procedure does not constitute conservation of a high grade.

Clam protection looking toward a uniform annual crop is confessedly in the experimental stage on the west coast of the United States. Theoretically a limit placed on the daily catch should bring about the desired result. In practice it may be necessary to close entirely certain districts for a period of years until a point is reached where the daily limit will not reduce the beds to the level of relatively unprofitable digging. It is frequently claimed that the species of clams living along shore extend beyond the low tide limit for long distances out to sea; but as a matter of fact conclusive evidence is largely lacking on this point. Japanese abalone divers have seen the so-called Pismo clam (*Tivela stultorum*) in fairly deep water about Morro in San Luis Obispo County, and dead shells of other species have been brought up on sounding leads at several points along the coast. The red abalone extends to a depth of at least two hundred and fifty feet but proof that

it extends beyond this point is lacking. Certain it is that after a bed has been cleaned up there is little to indicate that these deeper situated individuals migrate beachward. On the other hand, restocking appears to be largely due to young individuals.

Clams annually produce astonishingly large numbers of eggs. For example, a Pismo clam (See figure 59), somewhat over five inches in length, lays not less than 300,000; the ordinary black mussel (*Mytilus californica*) deposits fully 100,000; the red abalone (*Haliotis rufescens*), with a circumference of from eighteen to twenty inches, annually pro-

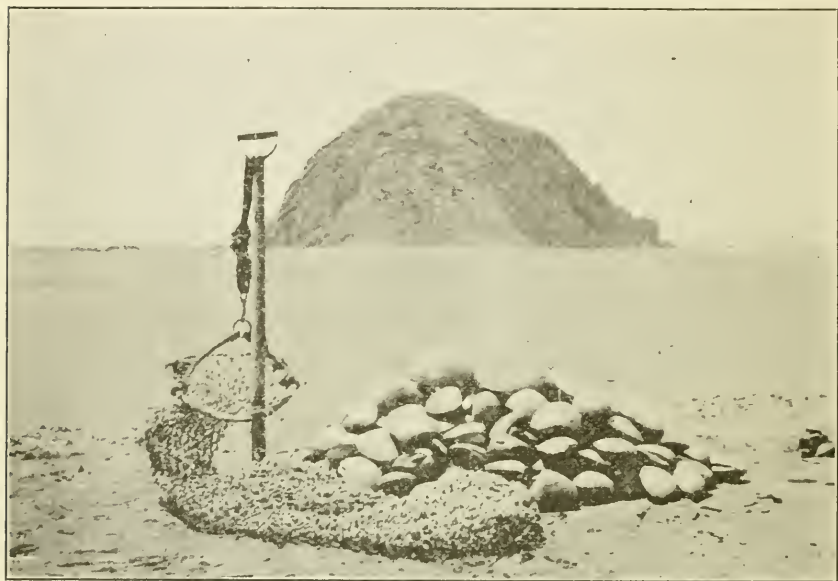


Fig. 59. Pismo clams in San Luis Obispo County. Photograph by C. S. Bauder.

duces between 1,000,000 and 2,000,000; and other species lay proportionately great quantities. On the basis of these facts, extravagant claims are made, one pair of clams being deemed sufficient to stock a beach fully a mile in length. It is stated on good authority that, were the offspring of all of the codfish to come to maturity, we could travel across the Atlantic and Pacific oceans, in a very few years, on the backs of codfish. Needless to say such a trip will never be made. Just as in the case of the codfish, the young clams from the beginning of their development are subject to the attacks of enemies, oceanic currents drive them into unfavorable situations, and a shortage of the food supply destroys myriads. This last named factor is perhaps the most important. The food of all clams and mussels consists *entirely* of minute animals and plants or fragments of larger organisms floating within reach of multitudes of tiny, vibrating, hairlike processes covering the body, which sweep these nutritive substances into the mouth. In the presence of an abundant food supply, it appears that beds abandoned by the clam digger have become restocked after a period of from seven to ten years. Other beds seemingly as well situated have remained untenanted after an interval of at least fifteen years.

This brings up the matter of artificial transplanting of clams. Generally speaking, the eggs of these animals are poured from openings of the body into the sea where they are fertilized by the male element. After a few days the resulting young become free-swimming, and by their own efforts and the agency of tidal currents, become widely scattered. Where a bed lies in the direct path of such currents it bids fair to become planted with young individuals; otherwise, equally favorable situations may remain unstocked. In several instances beds belonging to this last named class have been planted by hand and today are flourishing. In San Francisco Bay, for example, the soft shell, or mud, clam (*Mya arenaria*) was planted upwards of fifty years ago from stock taken along the Atlantic Coast. At the present time it is widely distributed and forms a valuable food product in



Fig. 60. Digging Pismo clams at Watsonville Beach, Santa Cruz County.

several of the western markets. Morro Bay, the Goleta estuary north of Santa Barbara, the estuary of Playa del Rey at Los Angeles, False Bay at San Diego, and the upper end of San Diego Bay appear to be good grounds for this species. The experiment could be made with comparatively little expense, and with an already established market, it is certainly worth the effort.

The Pismo clam, or quahog, has likewise been transplanted in several localities with gratifying results. In this connection it is important to note that large individuals of practically every species of clam are relatively helpless when removed from their burrows. Those species, like the mud clam with a "neck," which remain throughout life in a fixed situation, should be planted neck upward in holes (about three times the length of the shell) made by pushing a stake into the mud or sand. Roving types like the rock or sand clam, cockles, and Pismo clam, merely require to be buried a few inches.

The claim is often made that young clams are more tender and of better flavor than the mature animals; that protection therefore should be given the breeders; and the immature individuals only should be gathered. The first contention is undeniably correct, but were we to collect the young, it is to be doubted whether there would be any breeders to protect. It is safe to say the average clam digger, professional or otherwise, would rarely take the time to carefully bury the

larger individuals turned out in the course of a day's work; and, as indicated in the foregoing paragraph, unless these breeders are buried there is a small chance indeed that they will re-enter the sand or mud.

Furthermore, it is entirely possible to make commercial use of clams seldom, if ever, found in the markets at present. The ordinary black mussel (*Mytilus californica*), adhering by thousands to the rocks along several sections of our coast, is delicately flavored, grows rapidly, and deserve a wider market than it now has. A closely related species in France is nearly as highly esteemed as the oyster. On the west coast of North America there is a tradition that these animals are poisonous during certain months of the year. As a matter of fact they are no more harmful than other clams or oysters. When shellfish of any species are exposed for comparatively long periods of time on the rocks or in restaurant windows, where ice or cold water are lacking, the mucous coating of the body may become infected with bacteria and develop poisonous products in consequence. Obviously such a state of affairs is more readily brought about in the summer, and the old saying that oysters should be eaten only in months containing the letter "r" probably rests upon this fact. The breeding season of most of our edible mollusks also occurs in the summer, and after the sex products are shed the flesh is often rather watery and insipid. Nevertheless, if one is so inclined, there is no reason why he should not indulge his taste for this class of food during every month of the year.

The macomas, or white (*Macoma secta*), and bent-nosed (*M. nasuta*) sand clams are likewise highly palatable. Unfortunately, the digestive tract usually contains varying quantities of sand, though it is possible that this would pass from the body if the individuals were placed in submerged, anchored boxes. The experiment is well worth trying. The saxidome, big clam or butter clam (*Saxidomus giganteus*) is also abundant on various beaches throughout the state but is only sparingly dug. In adult individuals the shell, white or gray in color, measures from two to three inches in length and is marked by distinct concentric ridges parallel to the edge of the shell. Along the coast of British Columbia this species is extensively used and in California deserves to be marketed in greater quantities than at present.

In conclusion it may be said that the growth of a clam, mussel, oyster, abalone, etc., depends in large measure upon the amount of food available. One individual may reach the market size in two or three years or even less, while another from the same parent may remain of small size. Just now we are greatly in need of data relating to the rate of growth, to the breeding season, to the size when the various species commence to spawn, to the time of spawning and to the various species inhabiting beds of a given district. Conditions differ along the hundreds of miles of California coast, and in order to gain an adequate notion of the subject as a whole, it is highly desirable that careful observations be made in several distinct localities. Evidence of this character, accompanied by specimens when practicable, if sent to the State Fish and Game Commission, will go far toward clearing up many obscure features relating to shellfish and their culture.

A POSSIBLE ENEMY OF THE MOSQUITO.

By CLARENCE HAMILTON KENNEDY, Cornell University.

During July and August, 1915, the writer, through the assistance of the California Fish and Game Commission, had the opportunity of studying the aquatic insects in the streams of southern and eastern California, and of collecting the native fishes in the Mojave and Owens River watersheds. The work concerned itself principally with the problem of fish foods.

Among the things of interest discovered was a top-minnow in the Owens River, which can probably be used to advantage in combating the mosquito in those parts of the state where these insects are a pest about permanent fresh-water marshes. The only name that this interesting little fish bears besides the name "top-minnow," which the other members of this insectivorous family also carry, is its rather formidable

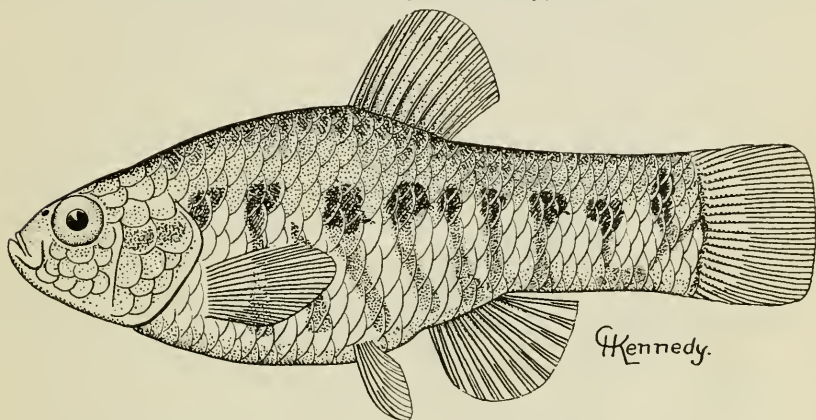


Fig. 61. The western top-minnow, *Cyprinodon macularius*. X3.

scientific name, *Cyprinodon macularius*. This name is unfortunately almost twice as long as its owner, as this fish is usually less than one and a half inches in length.

The top-minnows are a family of small fishes, the greater number of which feed on the various minute insects that breed in shallow water. It is in such a family of small insectivorous fishes that one would naturally look for an enemy of the mosquito. *Cyprinodon macularius* is the second top-minnow so far discovered in the fresh waters of California. Probably it has entered from the Colorado River drainage, where it is widely scattered. It is fortunate that a member of this useful family of fishes occurs as a native of the state, for such can be more readily utilized for mosquito control than any of those top-minnows native to the Central States.

A lengthy description of *Cyprinodon macularius* is superfluous as the drawing (fig. 61) shows the peculiar, barred pattern in shades of gray and white, which characterizes *Cyprinodon*. It seldom reaches over an inch and three-quarters in length and has a deep, bass-like shape. In the Owens Valley it is thought by many local people to be

the young of the large-mouth black bass, which was introduced into the valley by the State Fish and Game Commission a few years ago.

This fish was found in abundance in all the shallower parts of the sloughs and tule swamps at both Lone Pine and Laws. It was most abundant in the edges of the large tule swamp that lies in the big bend of Owens River between Laws and Bishop. At Laws the writer observed schools of these top-minnows nipping at specks floating in the little ditch that irrigated the hotel yard. This ditch was not over eighteen inches wide and six inches deep, and was over half a mile from the river. Every pool cut off by a gravel bar along the river contained a few of these little fish. They were apparently entirely comfortable in water not over four inches deep. The writer collected quantities of these fish by placing a butterfly net in the water and frightening the little fellows into it. By careful maneuvering sometimes a half a pint could be caught in one "haul of the net." A half

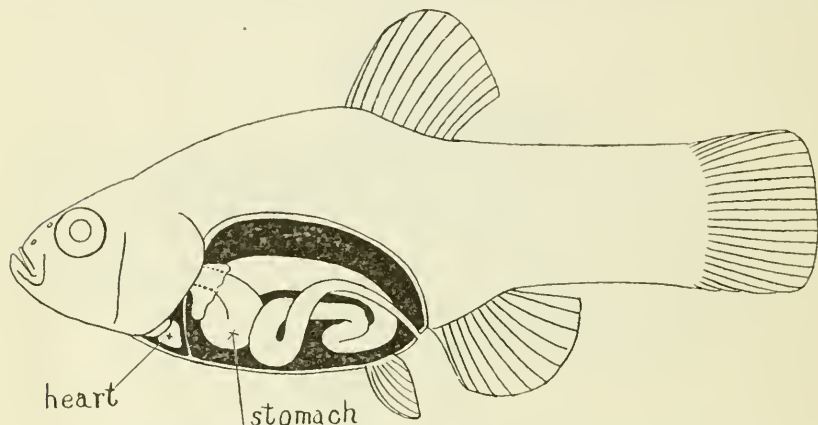


Fig. 62. Outline drawing showing the alimentary canal of the western top-minnow.

pint is a large number of these fish midgets, as they will average over two hundred and fifty individuals to a full pint. This small size is this fish's advantage, for as a consequence there is available to it as food the quantities of minute aquatic insects too small for the food of larger fish. Its small size also permits it to explore with ease and safety the shallow side pools swarming with insect life, that are too shallow for larger kinds of fish. In the fish "navy" these small fellows can be considered from two points of view as the "mosquito fleet."

The most interesting, though perhaps the most tedious part of this study, was the dissection of the fish and study of the stomach contents of these top-minnows. The illustration shows the arrangement of the alimentary canal (fig. 62). The stomach is quite long, contains a loop and shades insensibly into the intestine. The stomach had to be dissected out, opened, and its contents placed in a watch glass for a bowl, where the partially digested food could be examined under a microscope. The stomachs of all the fish examined were crammed with insect remains. Apparently *Cyprinodon*'s appetite was larger than his stomach. In nearly all cases nine-tenths of the contents were Chironomid fly larvæ (fig. 63). The Chironomid flies are a family of insects

so closely related to mosquitoes that only a trained entomologist can tell the insects of these families apart. Figure 64 shows the mosquito-like form of a Chironomid. The larvæ, usually bright red in color and

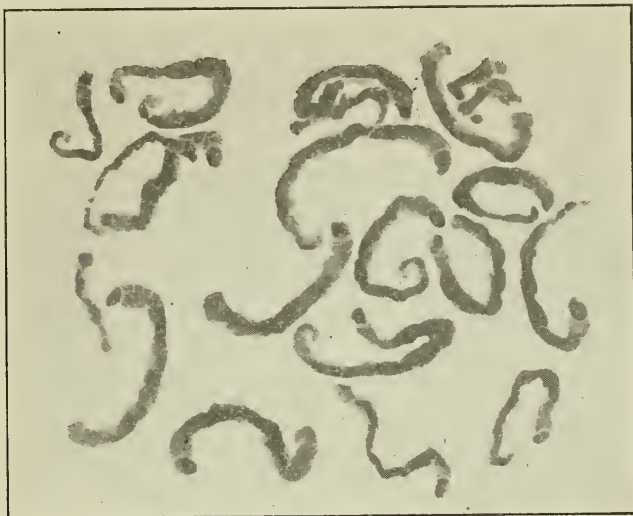


Fig. 63. Chironomid larvæ, the entire contents of the stomach of fish no. 14.

spoken of as blood worms, live in water much as do mosquito larvæ, while the adults are harmless, except a few species that suck blood, as do mosquitoes.

The following table shows the stomach contents of fourteen fish.

| No. | Length of fish in inches | Chironomids found | Other food |
|-----|--------------------------|-------------------|---|
| 1 | 1½ | 6 larvæ | |
| 2 | 1½ | 16 larvæ | 1 Estheria (crustacean). |
| 3 | 1½ | 24 larvæ | |
| | | 6 pupæ | 1 beetle. |
| 4 | 1¼ | 4 larvæ | |
| 5 | 1½ | 20 larvæ | |
| 6 | 1½ | 2 larvæ | |
| | | 1 pupa | 1 beetle, 1 mayfly larva, 1 adult mayfly. |
| 7 | 1½ | 23 larvæ | |
| | | 3 pupæ | 1 beetle larva. |
| 8 | 1½ | 23 larvæ | |
| 9 | 1½ | 12 larvæ | |
| | | 9 pupæ | 1 mayfly, 2 mayfly nymphs. |
| 10 | 1½ | 20 larvæ | |
| | | 2 pupæ | 1 mayfly larva. |
| 11 | 1¼ | 4 larvæ | |
| | | 2 pupæ | 1 mayfly nymph. |
| 12 | 1¾ | 14 larvæ | (This was a female with 50 mature eggs.) |
| 13 | 1¼ | 16 larvæ | (This was a female with 46 mature eggs.) |
| 14 | 1¼ | 17 larvæ | |

The great predominance of Chironomid larvæ and the large number in each stomach show at once what efficient destroyers of water insects these little fellows are. The absence of mosquito larvæ can be readily

accounted for by the lateness of the study, as mosquitoes have largely disappeared by August, through other causes. Chironomid larvæ are always abundant, for they have gills and not being compelled to come to the surface to breathe, as are mosquitoes, they live on the bottom and in trash where they have more protection from their enemies. The mosquito larvæ being compelled to live at the surface, where they are easily seen, are probably cleaned up by the fish early in the season.

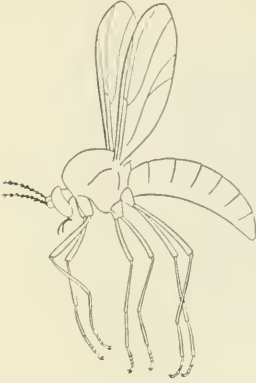


Fig. 64. A chironomid fly. These flies are close relatives of the mosquitoes and breed in all running and stagnant water.

At the time (August) of the writer's visit, mosquitoes were not troublesome at Laws, for the evenings were usually spent under the trees in the hotel yard, where entertainment was furnished by the hotel phonograph. Furthermore, the various individuals interviewed were positive that mosquitoes were never bad in the Owens Valley. If so, the condition is very different from that which exists in other irrigated sections of the West, for mosquitoes are usually one of the unpleasant features of irrigated pasture land.

The stickle-back, another small fish, has been tried as a mosquito exterminator, in parts of the state, with some success, but only a thorough trial can show whether this top-minnow can be used in territory outside of Owens Valley. Probably it can be of use in any permanent fresh-water marshland in the state, up to 3,000 or 4,000 feet elevation. Top-minnows of other species have been introduced with considerable success into Hawaii to combat mosquitoes.

ABALONE PEARL FORMATION.

By J. H. OLIVER.

Every one along the Pacific Coast is familiar with the abalone blister pearl (pholas caused) commonly seen in jewelry store windows. These are natural pearls taken from abalones (*Haliotis* sp.). The supply of these pearls, as well as the beautiful shells of the abalone, so widely used commercially, is fast becoming exhausted, due to the disappearance of this shellfish. Following along the rocky shore one observes this sign: "Abalone Trail," but as a rule, look as you will, you will find no abalones, so complete has been the destruction.

By the united effort of a number interested in the preservation of this beautiful species of the sea snail, laws were passed to check its obliteration, and a series of investigations were instituted. In each succeeding year gradual obliteration has been noted. Places where experimental work was carried on four years ago, and where abalones were then very plentiful, showed in March, 1916, an almost entire extirpation of the species. Better laws are now in force, but they need to be more widely observed.

In order to make a strong plea for the preservation of the abalone, a series of experiments to discover whether pearl nacre deposits could be induced within the abalone, have been carried on under a permit from the California Fish and Game Commission. Figure 65 shows the result of five months' deposit of nacre, after inserting a form against the mantle. This period of time appears to be too long for best results. Specimens of less nacre deposition have been secured in 57 days. These have been sent for record, observation, and study, to the zoology department of the University of California. Experiment has shown



Fig. 65. An artificial pearl produced by an abalone. This pearl is the result of five months' deposit of nacre.

the time for best results to be between 75 and 100 days. It requires from 1,400 to 1,500 days to secure similar results with Japanese culture pearls. Thus, our abalone deposits the desired nacre in one-fifteenth or one-twentieth of the time required for the formation of Japanese pearls, and it is evident that 15 or 20 pearls will be formed in the abalone while one is being deposited in the Japanese shells.

Variously colored pearls may be produced. In one instance a white pearly shell produced a most beautiful blue pearl. By noting the change of colors in the same pearl in different stages of formation, much is being learned of the causes underlying the production of color. After dissecting some of these pearls I am convinced that the various colors are produced by a dark skin, deposited between the layers of nacre, which acts as a reflecting surface. If this dark skin is removed from a thin pearl and replaced by a new color, such as magenta or blue, the color of the pearl is immediately affected by the new colors. When a sufficient amount of the dark skin is deposited with the nacre the valuable black pearl such as is found at Magdalena Bay, Mexico, is produced.

Figure 66 shows how numerous pearl deposits may be within the abalone and the abalone be unharmed. The specimen shown came from the vicinity of Morro Bay and displays nine perfect pearl forms and nine imperfect ones. The Point Lobos section produces larger, but less pearly colored forms; the Fort Bragg section numerous very large, irregular, and often seriously diseased forms, whereas the coasts of Mexico and southern California produce jet-black pearls in small quantity. The most favorable section for pearls of quality is Morro Bay (Cayucos, San Simeon, Port Hartford), while for those of size is Monterey (Point Lobos).

The results obtained in these experiments are not exceptional nor local, for similar and equally valuable results were secured along the



Fig. 66. Pearls artificially produced in an abalone by inserting forms against the mantle. Many pearls may be produced without injury to the shellfish. It took five months to produce these pearls.

English Channel at the Roseoff Laboratory by the late Dr. Boutan of Paris. Dr. Boutan's results as summarized in *La Nature* were published in the *Scientific American Supplement*, No. 1214, April 8, 1899. The report says: "All the abalones have secreted naere on a level with foreign bodies introduced, and, in many shells, have formed, at the surface of the naere, pearls, genuine, fine pearls, of which I submitted some samples at the Academy." (See fig. 67.)

"The first pearls obtained were not sufficiently detached from the shell and exhibited too wide a base of junction with the latter. In the subsequent experiments this defect was partially corrected; and, in recent specimens, it may be seen that the part of the pearl nearest the shell is covered with a layer of naere.

"It must be remarked, however, that although the pearls thus obtained artificially have the same chemical composition as natural ones, and have circular layers only at the periphery, which gives them the aspect sought, they contain in the interior a large nucleus of naere, of which the placing of the layers is necessarily different from that of the periphery."

Not only is the life of the shellfish conserved when pearls are produced artificially, but the animal can be forced to produce better pearls just as a cow can be forced to produce better milk and a chicken better eggs. In each instance the pearl is quietly removed and another form inserted in exactly the same place, and the abalone under more normal conditions produces pearl after pearl, as long as that portion of the mantle produces pure nacre. One mantle location produces

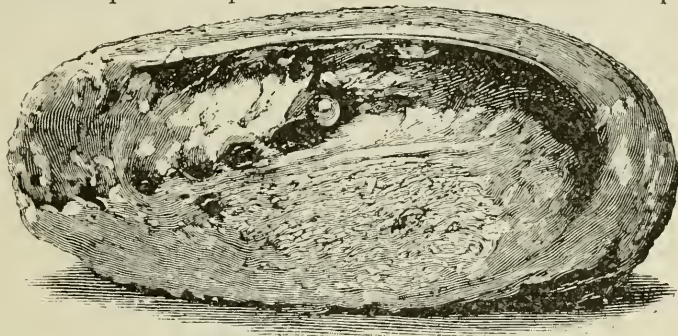


Fig. 67. Shell containing a pearl (From M. Boutan in Scientific American Supplement, April 8, 1899).

pearls in one shape and color, while another part produces an entirely different shape and color. How long an abalone will continue to produce pearls has not been determined.

It has been demonstrated that pearls of exquisite color and of great variation can be obtained by artificial means in the abalone. Pearl culture in California is therefore more than a possibility. All that is needed in order to develop a new and profitable industry is the conservation of the shellfish concerned, and the working out of the details of artificial pearl culture in some scientific laboratory.

FISH AND GAME IN SAN MATEO COUNTY.

By J. S. HUNTER, Assistant Executive Officer, California Fish and Game Commission.

Although all parts of San Mateo County are within thirty-five miles of San Francisco and but a few hours' ride by auto, there are few sections of the state better supplied with game and fish. A few years ago much better hunting was here available, but the coast region of San Mateo County still has much to offer.

Deer are plentiful in San Mateo County, owing largely to the great tracts of land upon which hunting is limited or entirely prohibited. On the Spring Valley land, comprising 30,000 acres, upon which hunting is exceedingly limited, and in the California Redwood Park, just across the south line of the county, where no hunting is allowed, deer breed undisturbed and increase rapidly. It is not unusual to see as many as a dozen deer in driving through the Spring Valley lands. When this protected area becomes crowded with deer, the overflow spreads into the adjoining parts of the county where hunting is allowed.

The protection thus afforded has made it possible to kill an average of 150 deer each year during several seasons past. Deer find the San Mateo hills particularly attractive and the cover is so thick that hunters are at considerable odds unless assisted by packs of well trained dogs.

The grizzly bear was once a common resident of the San Mateo peninsula. It is said that these bears were larger than the famous Kadiak Island grizzlies, supposedly the largest in the world. Many interesting tales are told of the raids of the grizzly on the San Mateo ranches in the early days. It is probable that the last grizzly was killed in the early seventies. Black bears were also resident, and the last one is reported to have been killed in the central part of the county in the early nineties. Enos Ralston, of San Gregorio, whose family settled on Corte Madera Creek in the late fifties, tells of a grizzly which he and his small brothers and sisters surprised while they were gathering berries. The bear was on one side of a great redwood log and the children on the other. When the children climbed the log they saw the bear directly below. It is doubtful whether the children or the bear was the more frightened.

The valley quail is the prize game bird of San Mateo County. Excellent quail shooting may be had in many parts of the county, and there is promise of improvement because of the recent shortening of the season and reduction of bag limit. Quail have, however, become particularly wary in this district, and it is now difficult to secure a limit, in spite of the abundance of birds. When a few shots are fired the gun-wise birds take to the high brush, and here it is impossible to find them. Mountain quail were found in fair numbers in the higher elevations some years ago, but it is doubtful whether one could be found in the county today.

San Mateo has long been famous for its splendid rabbit shooting. Both cottontail and brush rabbits are found, but brush rabbits are by far the more numerous. Excellent cover is afforded these animals by the brush-covered hills on the coast-side of the county, and with reasonable protection, the rabbit will long afford a source of enjoyment to the man who enjoys getting out with gun and dog. Hundreds of rabbit hunters are in the field continually during the rabbit season. San Mateo was perhaps the first county to give the rabbit the protection of a close season. The law was found so beneficial that a similar one was later passed by the state.

The gray tree squirrel is no longer considered game in San Mateo County, although it is found more or less commonly throughout the wooded parts, and even within the incorporated limits of the cities along the bay shore.

Marsh shooting has not improved during recent years. The salt ponds on the bay shore formerly afforded excellent duck shooting, but in recent years ducks have become noticeably scarce. In the morning and evening during the fall there is still an excellent flight of ducks between the Spring Valley lakes and the bay, but shooting is limited to a few moments at these times of the day, and it is difficult to get more than a few birds. Better bags of ducks are secured by hunters skilled in the use of the skulling oar, but this sort of hunting is rather hard work for the average person and is not commonly resorted to.

Rail shooting was formerly one of the sports of the county, but so much land has been reclaimed during the past few years that rail have been greatly reduced and it has become necessary to close the season on them. It is probable that in a few years these birds will have increased to such an extent that a short open season can be declared. The clapper rail is one of the best of table birds and is preferred by many to any other variety of game.

Of all the attractions of San Mateo County perhaps the foremost is its trout fishing. Miles and miles of excellent trout streams are easily accessible. Many of these streams are classics with the angling fraternity: it is only necessary to mention the Purissima, San Gregorio, Pescadero, Butano, or any of the other well-known streams to the clan to start the ball a-rolling, or more particularly, the reel a-spinning; and stories are told of the wonderful creels of fish that have been taken.

The streams of San Mateo County have been stocked by the Fish and Game Commission with thousands of lively fingerlings. The following is a record of the plantings since 1912:

| | |
|-------|----------------------------|
| 1912— | 150,000 steelhead trout. |
| | 6,000 eastern brook trout. |
| | 114,000 rainbow trout. |
| 1913— | 117,000 steelhead trout. |
| | 48,000 rainbow trout. |
| 1914— | 274,000 steelhead trout. |
| | 20,000 rainbow trout. |
| | 4,000 eastern brook trout. |
| 1915— | 400,000 steelhead trout. |
| | 80,000 rainbow trout. |

Total 1,213,000

In normal years the streams are stocked also by trout from the ocean that spawn naturally, so that, though the streams are heavily fished, there should be an abundance for everyone.

The ocean shore of San Mateo County is to many the point of greatest attraction. At low tide scores of residents and visitors from San Francisco find their way to the rocky reefs where the clam, mussel, and abalone grow. During the seasons when the smelt are spawning they run close to shore and are then taken by the sackful. Fresh smelt are deemed by many superior to trout. Salt water eel are also abundant along the rocky shore. The crabs of the San Mateo beaches are unsurpassed in flavor and are found in enormous quantities.

In addition to the planting of thousands of fish in the county, the Fish and Game Commission has maintained a constant patrol to guard against game and fish law violations. During the past four years \$10,596 was expended for patrol service, 231 arrests were made, and a total of \$4,120 collected in fines. The amount realized from hunting and angling licenses approximates \$5,955. The expenditures of the Commission on fish planting and patrol service is, therefore, greatly in excess of the money derived from the county, but the fact must of course be taken into consideration that money collected for licenses in San Francisco and other large cities is used in the fields and streams where the hunters from these points find their sport.

SHOOTING QUAIL FOR MARKET IN SAN MATEO COUNTY.

By E. B. RALSTON.

In 1861 my father, John Ralston, trapped quail on and around the old home ranch on the Corte Madera Creek, where he had located three years before. He captured sixty dozen birds in his traps, and confined them in cages built of split redwood, but being offered only 25 cents a dozen in San Francisco, the one available market, he tore open the cages and set the birds free.

I began shooting for market in 1868, using a muzzle-loader, but it was not until ten years later that I did any wing shooting. At that time I met a Mr. Johnson, who was a wing-shot as well as a "ground sluicer" and who was out shooting birds for market. He asked me to take one side of a ravine and shoot it out, while he took the other with a breechloader. Though I was no shot on the wing, I took my side, and to my own surprise dropped the first three birds that rose. This gave me courage, but I soon found that to stop and load my muzzle-loader was too slow. The advantage of a breech-loader was apparent by my friend's success, and I immediately purchased a breech-loader and began wing shooting.

In those years we hunted six months open season. I used a fourteen-gauge Parker shotgun, and with a single load in this gun I have killed 26, and by using both barrels, 29 quail. My highest record on ground shooting was 192 quail killed in seven shots; on wing and ground shooting in any one day 121 birds, and on straight wing shooting 106 birds out of 129 shots. This last record was made in an ideal place in grass left by the reaper alongside of a narrow willow run three-fourths of a mile in length.

Mr. Johnson, as evidence of the abundance of quail in this part of San Mateo County in the early days, states that he bagged five dozen birds while walking from his home to the stage station at San Gregorio, a distance of a few miles.

It was not until about 1869, when the Chinese flocked into this great quail section and began grubbing and clearing the hills and flats, that quail began to lessen in number. They were thus driven out of their feeding and watering places, away from cover and protection, and cattle and horses, in feeding on the wild grass, exposed and destroyed their nesting places, contributing largely to the decrease of the next few years.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

October 18, 1916.

"Conservation is the order of the day; it is in the air; it stands for the prevention of waste, for efficiency and progress."

OUR SECOND BIRTHDAY.

With this issue the second volume of CALIFORNIA FISH AND GAME is completed. Though the publication of this quarterly has necessitated an annual expenditure of several hundred dollars, the results obtained more than justify this outlay. If knowledge of the need and value of wild life conservation is a prerequisite to the preservation of our fish and game resources, then the most economical and effective method of bringing this about is being used. A man employed to make personal calls at five dollars per day could not interview more than eight people daily. A lecturer would find it difficult to reach regularly more than one hundred people during each working day. Only a portion of the people so reached would be convinced of the needs of wild life, for the spoken word is discounted more than the written word. CALIFORNIA FISH AND GAME has been received by close to five thousand people every three months. The large number of complimentary letters received, and the growing mailing list, indicate that the magazine does not find its way to the waste basket, but is read with interest and profit.

The Shad Number and the Deer Number were so well received that several special numbers such as these will be issued this coming year. We are also glad

to announce that a series of colored plates of game birds and game fishes will appear in forthcoming numbers. These plates are four-color reproductions of paintings by Louis Agassiz Fuertes and Charles Bradford Hudson and will be suitable for framing.

N.B.—In order to bring the mailing list up to date we are enclosing in each copy of the October number a card which everyone interested in receiving the quarterly should fill out and return promptly. Unless this card is received before the next number is ready for mailing, the name of the recipient will be removed from the mailing list.

A NEW DEPARTMENT.

All notes relating to hatcheries and fish culture will hereafter appear in a separate department under the heading "Hatchery Notes." The department will be edited by Mr. W. H. Shebley, In Charge Fish Culture. Mr. N. B. Scofield will continue to edit the department: "Commercial Fishery Notes." Mr. L. H. Whiteman, In Charge Information, United States Forest Service, is editing the department: "United States Forest Service Co-operation."

A CHAIN OF GAME REFUGES FOR CALIFORNIA.

Believing that a chain of game sanctuaries can best insure our game supply, the Fish and Game Commission is co-operating with the United States Forest Service in gathering data relative to suitable situations for game refuges within the national forests. The supervisors of the various national forests have recommended twenty-two new refuges comprising a total area of 925,125 acres. Five supervisors are opposed to the creation of refuges in their respective forests, but all of the rest recommended one or more areas.

Some of the areas recommended are too large and others will not be available for other reasons. Nevertheless, when the present plans are worked out, a chain of sanctuaries extending from San Diego County to Siskiyou County will be established, either by federal enactment, if the Chamberlain-Hayden bill is passed by Congress, or by state enactment at the next session of the legislature.



Fig. 68. A high mountain lake. Trout have been planted in practically every lake of this size in the high Sierras.

FISHING POPULAR.

The opening of the fishing season last spring showed that angling is becoming more and more popular. As evidence of the large number of fishermen in the field on the opening day, the following is of interest. Deputy Hoen counted 199 fishermen on Paper Mill Creek, in Marin County. At least 485 special permits were given to fishermen desiring to try their luck in Wild Horse Lake by the Water Company of Vallejo. Deputy Armstrong reported 220 men at the lake on the opening day, and a catch of about 1,800 pounds of trout.

GAME RESOURCES OF CALIFORNIA ADVERTISED BY FOREST SERVICE.

The United States Forest Service has issued recreation maps of the different national forests of California for the use of campers and travelers. The maps show the principal mountains, streams, settlements, etc., of each forest, and also the best camp grounds and localities where deer, bear and other game are abundant. On the back of each map is information regarding the location of the

forest, history and purposes, administration, physiography and resources, climatic conditions, fishing and hunting, aid to campers, horse feed and supplies, hotels and suggested trips. On the back of the Trinity National Forest map, for instance, the fishing and hunting conditions are thus described:

"The Trinity National Forest is considered a paradise for sportsmen. Streams and lakes are well stocked with trout. In the south fork of the Trinity River the salmon fishing is excellent. Small game, quail, grouse, squirrel, and rabbits are plentiful almost everywhere. Deer, bears, and panthers are found in the more isolated regions. In the southern part of the Forest, the best game region, is located the Trinity Game Refuge. In this refuge, established by the State of California, hunting is forbidden, and predatory animals can be killed only by permission of the State Fish and Game Commission. Deer are so plentiful here that they may be seen at any time, and even photographed about the salt licks."

Information as to the distribution of trout in 1912, 1913, and 1915, as to the securing of fishing licenses, and excerpts from the fish and game laws follow.

RANCHERS PROTECT GAME.

A number of ranch owners in this state are improving game conditions by making game refuges of their property. A recent instance is afforded by the Marshall ranch, owned by A. H. Marshall, comprising 460 acres in Trinity County. No one is allowed to kill any bird or animal, except predatory animals, at any time, either in or out of season; nor does

stroyers. Sacramento will probably be the first city in northern California to inaugurate control measures.

REGULATIONS FOR THE PROTECTION OF MIGRATORY BIRDS.

New federal regulations for the protection of migratory and insectivorous birds were issued August 21, 1916. One change in the law is unfortunate and



Fig. 69. A catch of rainbow trout on the north fork of the Feather River. Photograph by F. A. Farnum.

the excuse that wild birds or animals are damaging crops allow this rule to be infringed upon.

THE CAMPAIGN AGAINST THE ENGLISH SPARROW.

As a result of the publicity campaign begun by the commission, a number of cities have instituted control measures. The latest report from the officially appointed sparrow destroyer of San Diego is to the effect that 415 European house sparrows, more commonly known as "English sparrows," have been killed, and it is estimated that not more than 20 sparrows still remain in the city. That the greater portion of these bird pests have been destroyed in San Diego is evidenced by additional reports from interested parties. According to newspaper reports the cities of Riverside and Redlands have also instituted campaigns and have appointed official sparrow de-

will have the effect of losing for the law some of the support which it would otherwise have obtained. The opening of the season on waterfowl is extended to October 16th. Since California laws were made to conform to the former regulations the open season on waterfowl begins on October 15th, according to state law. A protest against this change has been sent to the proper authorities, but there is little hope that resultant confusion will be avoided on the opening day.

The other change is to be commended. All shore birds with the exception of the Wilson snipe, are to be protected until September 1, 1918. This eliminates the shooting of golden and black-breasted plover and greater and lesser yellowlegs. Since but few shoot these birds, and since the need of additional protection for them is evident, there will doubtless be a willing observance of this provision in this state.

The Senate's approval the last of August of the treaty with Canada, which provides for like protection of migratory birds in both countries, will have a direct bearing on the constitutionality of the federal law.

STATEMENT OF THE FEDERAL ADVISORY COMMITTEE OF THE MIGRATORY BIRD LAW.

The members of the Advisory Committee to the Department of Agriculture on the Migratory Bird Law, in view of the fact that new regulations setting forth closed seasons on migratory waterfowl and birds were made public August 21, 1916, have given out the following statement:

To The People of the United States:

The Advisory Committee appointed by the Secretary of Agriculture, Hon. D. F. Houston, to co-operate with the Bureau of Biological Survey in fixing the regulations for closed seasons on migratory birds, as authorized by the Federal Migratory Bird Law, desires to state to the people of the country that after the most exhaustive investigation and the most careful consideration of every point raised, the regulations as promulgated were unanimously recommended by the members of this committee. We realize the utter impossibility of even attempting to satisfy all that desire to shoot migratory birds.

In recommending the regulations we were controlled by the following considerations:

First—A most earnest desire to save from certain depletion and threatened annihilation the valuable waterfowl, game and insectivorous birds which migrate across the United States twice each year.

Second—To accord the hunters in the various states as nearly as possible an equal opportunity of taking migratory waterfowl and nomadic game birds.

Third—To open the seasons during which these birds can be legally killed in those months when under normal weather and food conditions the largest number of migratory waterfowl and birds sojourn in any particular state.

Fourth—To absolutely eliminate spring shooting, when migratory waterfowl and birds on the northward migration are journeying towards their breeding grounds, thus impelled by the resistless force of nature, to mate, nest and reproduce their species.

Fifth—To recognize unusual and extraordinary conditions existing in a few of the states, without affecting the equity or vested rights of the people of the whole country in the migratory wild life.

Sixth—To submit reasonable, practical, fair and just regulations that should invite the support of all true conservationists.

Seventh—To guarantee not only to the present generation a reasonable supply of migratory wild life, but to so protect it that it will multiply and be handed to future generations as their proper and rightful heritage.

The imperative necessity for the enactment of the federal migratory bird law is palpable to every thoughtful and discerning mind.

Migratory wild life does not even recognize national, to say nothing of state, lines. The variability of the statutes of the states protecting these migrants, the lack of uniformity in these laws, the rapacity with which the nomadic birds are slaughtered by voracious annihilators of wild life in many of the states to the detriment of the people at large, compelled the conclusion of Congress that the exigencies of the situation demanded federal regulations that would, in reality, save the migratory waterfowl and birds from extermination.

The people of no country have been so abundantly blessed with valuable natural resources as ours.

The American people are notoriously a nation of wasters. Only by reason of the fact that their natural resources are fast disappearing have they been induced to extend even a modicum of conservation to these fast-vanishing assets.

Conservation does not mean preventing the use of our natural resources as a miser would hoard his gold, but means the wise and careful use of our national heritage, taking therefrom only a sufficient quantity to supply our needs, with the full realization that we are trustees for future generations.

We are convinced that under the operation of this law shooting will improve each year.

The need of the hour has heretofore appeared to be uppermost in the minds of the people. They have drawn recklessly on their natural inheritance with scarcely a thought of the future. It is a notable fact that in our rapacity for slaughter many of the most valuable species of game and birds that formerly abounded in this country have been annihilated.

The wild or passenger pigeon that formerly swarmed over eastern North America in countless millions has become extinct. The American bison, found on the great plains of the West, was slaughtered by hide hunters to the point of extermination. The great auk, the Eskimo curlew, the Labrador duck, the Carolina parakeet, have been exterminated. There are many other valuable North American birds that are candidates for extinction, including the whooping crane, trumpeter swan, American flamingo, roseate spoonbill, scarlet ibis, long-billed cur-

lew, upland plover, Hudsonian godwit, red-breasted sandpiper, golden plover, dowitcher, willet, pectoral sandpiper, black-capped petrel, American egret, snowy egret, wood duck, band-tailed pigeon, heath hen, sage grouse, white-tailed kite, prairie sharptail, pinnated grouse and woodcock.

Future eventuations can only be judged by those that have gone before, hence the enactment and the enforcement of a comprehensive system of federal conservation of migratory wild life was made necessary if this valuable asset was to be retained among the resources of the United States.

Aside from æsthetic consideration, birds and game constitute a valuable article of food. From a recreational standpoint, this resource is of the greatest value to our people.

We feel that the failure of any American citizen to accord the federal migratory bird law his most active support is due either to lack of information or selfishness.

We therefore urge and request all patriotic citizens to exert their influence to the utmost to the end that the incalculable benefits contemplated by this law, and most specifically accruing to the people under the regulations just promulgated, be given their moral support, that the enlightened conscience of the people may be quickened to a full observance and vigilant enforcement of this wise and progressive conservation measure.

JOHN B. BURNHAM, N. Y., Chairman.
HON. EDW. G. BRADFORD, JR., Dela.
HON. F. W. CHAMBERS, Utah.
W. L. FINLEY, Oregon.
DR. E. H. FORBUSH, Mass.
DR. GEO. B. GRINNELL, New York.
DR. WM. T. HORNADAY, New York.
CLARK McADAMS, Missouri.
MARSHALL McLEAN, New York.
CLINTON M. ODELL, Minn.
T. GILBERT PEARSON, New York.
HON. ERNEST SCHAEFFLE, Cal.
HON. GEO. SHIRAS, 3d, Mich.
HON. JOHN H. WALLACE, JR., Ala.

THE CHAMBERLAIN-HAYDEN GAME SANCTUARY BILL.

The Permanent Wild Life Protection Fund has been making every effort to force the passage of the Chamberlain-Hayden Game Sanctuary Bill. The bill has been acted upon favorably by both the Senate and the House committees, but the pressure of business during the closing session has, up to September 1, prevented the bill being brought to a vote. It is reported that in the Senate the situation is satisfactory, in spite of the fact that four senators are opposed to the bill. Conditions in the House of Representatives, however, are not nearly

so good, and all those interested in the bill are being asked to urge their congressmen to bring the bill to a vote under a suspension of the rules, as soon as possible.

This Sanctuary Bill has been endorsed by an ex-president of the United States, by twelve state governors, by fifteen state game commissioners and state game wardens, by dozens of high state officers, by the presidents and professors of seven western state universities, by scores of organizations of sportsmen, zoologists, stockmen and businessmen, by clubs and societies of many kinds, by practically all of the national organizations for the protection of wild life, by dozens of influential newspapers and magazines, and by thousands of unattached citizens of prominence who have declared in writing their endorsement and support. The great Order of Elks, also, at its grand annual conclave, gave this cause a ringing endorsement and appointed a special committee to press the matter before Congress without delay.

In defense of the bill the following statements are made: "This bill would take nothing from the public domain! It would not change the legal status of one acre of public land, except by protecting the game upon it from being killed.

"It would sequester no agricultural lands and no grazing lands! The areas in view for these sanctuaries are the wild, remote, rugged and now useless regions, utterly useless for agriculture and for grazing. Any settler who goes into such a region to live is doomed to perpetual poverty because he can not conquer steep mountainsides and V-shaped valleys.

"This matter is proposed to Congress on a basis of absolute good faith. It is not intended as an 'entering wedge' for big new appropriations and a lot of new high-salaried positions; but eventually it will cost about \$20,000 per year of extra money. If the plan is not worth \$20,000 per year, it is not worth considering. We call it real, constructive conservation, on a large scale, at practically no extra cost.

"If at any time the people of the United States decide that the public welfare demands the breaking up of the national forests, and their opening to settlement and land speculation, then 'let the tail go with the hide,' and deconsecrate and break up the game sanctuaries

at the same time. The East can stand it if the West can; and there is nothing in the proposed law that can prevent its repeal.

"In the states that will be affected by the proposed game sanctuary plan, there are probably 1,000,000 men and boys who go hunting each year, and kill game—if they can find any! To them this bill means a continuation of legitimate sport;

informal English two opposing views of a mooted question—EDITOR.]

REQUA, Cal.,
May 27, 1916.

Fish and Game Commission,
San Francisco, Cal.

DEAR SIR: Long time before White Man come, Indians eat fish, acorus and deer meat, that's all. He gets just what he wants to eat. Eat 'um fresh in summer time smoke 'um for after awhile



Fig. 70. Child feeding pet deer. Photograph by Mrs. H. M. Sharp.

and state control alone means the extermination of big-game hunting in the near future. These are hard facts, not theories; and the American people can take them or leave them."

AN INDIAN'S VIEW OF BURNING, AND A REPLY.

[The Fish and Game Commission recently received an interesting letter, purporting to be written by an Indian of Del Norte County, which contained a plea for the burning of forest areas to destroy pests and renew growth. The United States Forest Service has furnished an answer. Both letters are here published because they entertainingly express in

when winter come. Deer, elk and bear him eat grass, young brush and acorn and wild berry. Every winter too much wet so everything grow very fast; you see White Man he cut out all old wood on berry bushes and on fruit trees, because he know berry and fruit tree grow much large on new wood, more than old wood, he know bug eat leaf and worm get in fruit and make 'um no good for eat; well you see Indian know all this too because long time before White Man come, Indian here. White Man he take care of what he plant and what he use. White Man he have time every year to cut out old wood and make lots of big berry and fruit grow, for what he wants to eat, but he forget to fix mountain land for elk, bear and deer to eat. WHY HE DON'T KNOW SAME 'BOUT FOREST? White man cut brush in pasture so grass grow for stock to eat; but Indian no have berry

bush and fruit tree to plant so he have to fix all wild berry bush and fruit tree and make brush stop so not choke grass. Indian have no medicine to put on all places where bug and worm are, so he burn; every year Indian burn. Fire burn off old wood on berry bush make new wood grow and lots big berry come.

Fire burn up old acorn that fall on ground. Old acorn on ground have lots worm; no burn old acorn, no burn old bark, old leaves, bugs and worms come more every year. Fire make new sprout for deer and elk to eat and kill lots brush so always have plenty open grass land for grass. No fire brush grow quick and after while choke out all grass and make too much shade, then grass get sour, no good for eat. No fire then too much leaf stay on ground, no grass can grow up, too much dead leaf, ground get sour. Indian burn every year just same, so keep all ground clean, no bark, no dead leaf, no old wood on ground, no old wood on brush, so no bug can stay to eat leaf and no worm can stay to eat berry and acorn. Not much on ground to make hot fire so never hurt big trees, where fire burn. Now White Man never burn; he pass law to stop all fire in forest and wild pasture and all time he keep right on cutting out old wood on berry bush and fruit tree and cut brush off grass land and put medicine to kill worms and bugs. WHY HE NO LET FIRE DO SAME IN FOREST AS HE DO TO BERRY BUSH AND FRUIT TREE? White man say he don't understand why wild berry get small and more few every year and acorn all get wormy, and no more grass land, and why deer die when they eat sour grass, under brush and tree, made sour by too much shade.

Indian know, and bye-un-bye White Man say he know too, but Indian say, WHITE MAN YOU KNOW TOO LATE.

Yours truly,

(Signed) KLAMATH RIVER JACK.

DEAR JACK:

A while back you wrote a letter to the man in San Francisco who is the Boss of the Outfit that takes care of the deer and the fish and the birds. You told him how things were in the woods and the mountains before the white man came along. You asked lots of questions too, Jack, and I want to tell you why the white man does things like you say.

We won't get into any college debate and use dictionary words: let's start with the main thing, grub. You eat deer meat, fish and acorns. You want lots of these things, so to keep the supply going you set fires in the woods. They burn over a big country and then next spring you see lots of new shoots on the brush; manzanita, scrub oak, snowbrush and all the rest of them. But you don't see any shoots on the little pines and firs, do you? No! They are dry and dead; all of them up to about twenty feet high. Maybe that don't mean anything to you because

the pine tree ain't good feed for deer. But I want to tell why it does mean something to you and to the deer, too.

You say that the white man prunes his bushes to make them grow better—that's true. You say that the Indian prunes his wild bushes with fire and he gets the same results—that's true. But, Jack, do you want the brush to grow so thick? Most Indians say no. They want to ride through the woods without having to fight their way through brush. Now, the two best friends the thick, heavy brush has got are sun and fire. When the fire runs through, it burns the old wood on the brush and in the spring there are ten little stalks started where there were only two before. But at the same time all the young pine trees are killed. Then there is not much left to throw shade on the brush and after a few years living in the open sun the brush field is lots thicker than it ever was before and there is no grass and the deer are forced to go back under the heavy timber where the ground is open.

Of course that fire didn't burn the big pine trees, but how long do you think those big trees are going to live?—not a great many years. And when they die there are no trees to take their places because you burnt all the little trees while they were growing up. And then there will be nothing but brush fields and no shade for man and deer to travel in and no grass because the brush is so thick. Now, what would have happened if there had been no fire? The little pine trees would have pushed their heads up over the brush and spread out their branches and thrown shade over the brush. As they got bigger and made lots of shade the brush would have got sick and finally died out just like a flower that you try to make grow in a tin can in your dark cabin. And why is this? Just because brush can not stand shade.

Not long ago I went over to Frank Long's to offer him a job on the White Horse Road. Thought I'd make a cut-off and save some time so I rode up the ridge back of Adam's cabin and figured to cut across Elk Creek Canyon. I was in the open timber all the way until I started down the side of the canyon and ran plumb into that long brush field you can see from the river. You know, the one that runs from the Queen Mine flume clear to the top of the mountain. I tried to jam through it but couldn't make it, so had to ride clear up and around the brush.

Did you ever stop to think what made that brush field? Do you know that all through it there are old black stumps burned clear into the ground? Fire did it. When I asked Frank about it he said that three big fires had run over that place in the last 20 years. Are there any berries in that strip; is there any grass in there; can you hunt in there? No, Jack, because your fire is bad medicine. If that place had been left alone

there would be big timber all over it and you could ride anywhere and there would be lots of grass on the ground for deer and cattle.

And, Jack, if your acorns are wormy, don't blame it on the white man keeping fire out of the country—there are a good many other things that keep bugs alive. And I have seen the best kind of acorn crops in places that never felt a fire. Anyway, there are other things that make better flour than acorns; why not plant some grain and vegetables and fruit trees on that flat back of your cabin? That's white man's grub, but its pretty good.

Yours truly,

(Signed) JIM CASEY,
Forest Ranger.

BRITISH COLUMBIA HAS ESTABLISHED THE HUNGARIAN PARTRIDGE.

In contrast with the general failure to establish the Hungarian or European partridge in the United States is the success attained in British Columbia. A recent report states that an open season of two days was declared on these birds last year. On November 13 and 14, 1915, shooting was allowed in the Delta District. Many hunters were in the field, but only small bags were obtained. Probably between 400 and 500 birds were killed. If conditions are satisfactory another open season of two days will be declared next year.

OBTAIN AN AUTHORITATIVE WORK ON PHEASANT BREEDING FREE.

Through the courtesy of the American Game Protective Association we are enabled to offer free of charge to game breeders in this state a limited number of copies of E. A. Quarles' authoritative work "American Pheasant Breeding and Shooting." The book, based on the experience of the most successful breeders in the United States, gives detailed information on the hatching and rearing of pheasants and is illustrated with fifty half tones. Everyone engaged in pheasant breeding and everyone who contemplates rearing these birds should possess a copy of this book. Make application to Bureau of Education, Publicity and Research, Museum of Vertebrate Zoology, Berkeley, Cal., and include six cents in stamps to cover postage.

FOUR CLASSES OF VIOLATORS.

In the American Game Protective Association's Bulletin of February 15, 1916, there appeared the following:

"Violators of game laws may be divided into three general classes:

"The young.

"The ignorant.

"The thoughtless.



Fig. 71. Commissioner Westerfeld, Attorney Duke and Deputy Ober crossing pass on way to Rae Lakes, August 16, 1916. Photograph by J. L. Von Blon.

"Education, and the creation of a sentiment which will make a man ashamed of himself for taking what does not belong to him, are the two weapons with which all of these classes must be opposed. Organization is the medium through which these weapons can be most successfully used."

To these three classes should be added a fourth—the willful. We regret to say that there are many belonging to this class in our state. The men who persist in exceeding the limit on ducks because a game warden is not at hand and the men who continue to hunt for deer, ostensibly "for the outdoor exercise," after having procured two bucks, are willful violators and can not even be classified among the "thoughtless." Those of this class, more than those of any other, need the stern hand of the law as an educational force.

CLUB URGES PROTECTION OF HARMLESS SNAKES.

The Lorquin Natural History Club of the Southwest Museum, Los Angeles, California, has been placing neat signs of tin in many places in the mountains urging the protection of harmless snakes.

A record of the altitude at which each sign is placed draws the attention of those who might not otherwise read the inscription which is as follows:

DO NOT KILL HARMLESS SNAKES.

THEY DESTROY DISEASE-BEARING
RODENT PESTS.

THE ONLY HARMFUL SNAKES IN
CALIFORNIA ARE RATTLESNAKES

Altitude -----

A WARDEN'S DUTIES IN PENNSYLVANIA.

According to Dr. Joseph Kalbfus, executive officer of the Pennsylvania Fish and Game Commission, the duties of the fifty paid game protectors in Pennsylvania is not only to arrest men who may violate the law, but to keep in touch with the people, that they may understand what game protection means; to locate game

of various kinds; to feed game and wild birds when necessity requires; to assist in every way in the extermination of vermin; to destroy dogs that are out of place and in turn have become vermin; to extinguish forest fires, and to do such other things as may add to the protection of, and the increase of game and useful wild birds. Each game protector is paid a salary of \$75.00 a month, in addition to traveling expenses.

A NEW DANGER TO BIRDS IN ENGLAND.

In England old-fashioned agriculturists are attempting to instigate a wholesale killing of the birds, based on the plea that in these times no share of the crops can be spared to birds.—*Current Items of Interest, April 11, 1916.*

SOME SUGGESTED CHANGES IN FISH AND GAME LAWS.

Some radical changes in our game laws are suggested in the following letter by one of our readers. Some of the points are well taken although all may not agree as to the desirability of many of the suggested changes.

Although I believe that our fish and game commissioners are doing what they think best for all, I believe that our laws should be made more strict and a tighter line drawn. It is my opinion that our daily bag limits on both waterfowl and upland game are in many cases too large and should be cut down. My reasons for wishing to see this change are these: The present bag limits permit a man to kill more than he can use himself, and allows him to distribute the surplus among his friends. It encourages him to slaughter, and encourages his friends to depend upon him for their supply of wild game.

Were the bag limit reduced to an amount sufficient only for a man's own needs, it would cause him to be appreciative of his privilege to hunt wild game, would take him out more frequently into the open, which would mean more to his health, and would give him more practice with a gun. On the other hand, the man who has been depending upon his friend for his game supply would be called upon to hunt for his own, thereby bringing others out into the open to get healthful exercise. It would also encourage the use of the gun, thereby making more and better marksmen to defend the country in time of trouble, and would help swell the state's fund through additional licenses.

Our present "district system," I believe should be abolished, thereby allowing a party killing game in one part of

the state to take it into another. Instead of dividing the state into districts certain sections and streams of each and every county should be closed to hunting and fishing for certain periods, say from one to three years at a time; then when these sections are opened other sections of the country should be closed, and so on. At the same time the present open and close seasons should prevail in the open sections. This would allow fish and game a splendid opportunity to breed and multiply unmolested in a district during the close season. And as hunters would not frequent the closed sections the game therein would become man-shy and thus afford plenty of sport to the hunter. This would in a short time give to this state a greater reputation as a game state than it has ever enjoyed and place good hunting within the easy reach of all.—CLIFTON A. WOOD.

FOR SELFISH REASONS.

The world is beautiful; only man is vile. Witness a shady bower in a beautiful mountain canyon on a hot summer's day. A clear, sparkling stream is trickling musically down over the shining pebbles or between moss-grown boulders; flowers are blooming; the ground under the trees is carpeted with ferns and tender grass; birds are warbling cheerfully and all is peace, repose and loveliness. Suddenly a crowd of picnickers come surging through the bushes and, spying our quiet nook, decide it is the ideal place for a picnic, so down go the lunch baskets, off come the coats and hats and the picnic is on, full blast.

The hot summer day passes, and when the cool evening hours come the picnic party gathers *some* of its belongings and starts for home. *Now* peep through the branches at our Eden. The vines are torn and broken, branches pulled off of the trees lie scattered hither and yon; cardboard pic plates cling to the wild-rose bushes or repose unblushing in beds of moss; a broken wicker basket is dangling from a tree branch; a gaudy catsup bottle stands guard over an old shoe box and some banana peelings, while an empty bean can graces the edge of our crystal stream. Gone now is the charm of our woodland bower, disorder reigns where beauty once held sway. Small wonder then that the birds and squirrels voice their remonstrance in complaining accents. Nature will be long in repairing the damage so carelessly done.

When it is our pleasure to visit one of nature's Edens, let us remember that

some day, others may want to enjoy it as we are enjoying it now, or let us remember that we ourselves may some time wish to return, so, for purely selfish reasons, let's bury the cans, papers, and peelings, then go our way knowing that nature will turn these unsightly things into flowers and grass and ferns to refresh and gladden us on some other summer's day.—JOS. A. BEEK.

DO CORMORANTS EAT FISH?

Cormorants, or shags, are continually accused of destroying quantities of food fish. The following quotations taken from a paper by P. A. Taverner of the Canadian Geological Survey are of particular interest in that they bring out the results of an investigation into the relation of the double-crested cormorant (*Phalacrocorax auritus*) to the salmon industries on the Gulf of St. Lawrence (Canada Department of Mines, Museum Bull. No. 13, pp. 1-24). We can not say whether our species of cormorants prey upon salmon, but it seems probable that many of the stories in circulation are as exaggerated as those which led to the investigation carried on in eastern Canada.

"Evidence apparently against the cormorants is not wanting. Knowing that all the salmon smolt must pass through the estuarine mouths of the rivers to the sea and again repass them when ascending as grise the presence of numbers of fish-eating birds of itself is disturbing enough, but when one hears from reliable sources that some twenty-seven fingerling salmon (parr) have been taken from the crop of one cormorant, the evidence superficially looks alarming. Investigation, however, shows that these constantly reported tales are variants of a few cases so often repeated as to greatly exaggerate their importance and hide their exceptional character. But all cormorants found on the upper reaches of the rivers must, until other evidence is forthcoming, be assumed to eat salmon, as they and a few trout are practically the only fish the waters contain.

"On the coast, about Percé, the cormorants certainly do the fishermen a certain amount of injury. It is not the salmon industries that are affected here, but the cod-fishing. During a large part of the season the codfishers rely altogether upon herring for bait and for this purpose the herring nets are set nightly. When these fish are abundant the toll taken by cormorants is not noticeable, but when, as regularly occurs, herring are scarce, the

birds go to the nets and help themselves to the contents. The few herring they take are on the whole only a bagatelle; but when half a dozen small fish is all that can be expected from a net to serve for a day's fishing, and half or more are taken by cormorants, the fishermen can hardly be criticized for giving vent to some evidences of discontent at the loss of a day's work and profit. However, though the fishermen do look upon the cormorants as one of their natural enemies, they do not seem to be bitter against them; not nearly as much so as the salmon anglers; who only have a sporting interest in their fish and are not dependent upon them for a livelihood.

"The population of fry produced by the birth rate is greater than can be raised and the surplus must necessarily be reduced, if not by one agent, then by another. There is a point to be reached when even an immense increase in the number of fry introduced into the streams will be ineffective in increasing the output of smolt. As the birth rate has been evolved under present conditions of food supply and enemy factors, the natural conclusion is, that the kingfishers and the shelldrakes are compensated for in it. The natural increase was sufficient to stock the river in the past to abundance, in spite of these enemies, and there is no reason to suspect that it is less effective now. Hence, if man introduces sufficient fry to compensate for the ova that should be laid by the breeding fish he captures, probably the highest possible efficiency of the streams under the present food conditions will be reached. If this is done the shelldrakes and kingfishers can be neglected except to see that they do not increase to an abnormal extent.

"In conclusion it may be said that

I. The total effect of bird enemies upon salmon is small, if any.

II. Hatcheries and fry planting will compensate for the toll of mature fish taken by man.

III. The number of smolt that go to sea is dependent upon the food supply in the streams.

IV. The number of returning salmon is governed by the extent of their deep sea habitat and the number of enemies there.

V. While planting may return an exhausted stream to its normal capacity, the number of fish can not be indefinitely increased, without a readjustment of other critical conditions.

VI. Eliminating the question of poaching, stream defilement, and other abnormal conditions, the problem of increasing the salmon run in the rivers, above the natural capacity of the streams, lies between increasing the parr food in them or reducing the enemies of the salmon in the deep sea habitat."

GAME BIRDS FOR SALE.

The stock of game birds at present held on the State Game Farm at Hayward will be sold at reasonable prices to game breeders. The species represented are: ring-necked, golden and silver pheasants and valley quail. Ducks of the following species are also offered: mallard, pintail, spoonbill, cinnamon teal, green-winged teal and fulvous tree-ducks. Apply to Superintendent, State Game Farm, Hayward, Cal., for prices.

HATCHERY NOTES.

W. H. SHEBLEY, Editor.

THE SHAD HATCHERY AT YUBA CITY.

The shad hatchery at Yuba City was closed August 1st, after experimenting and studying the movements of shad in the Sacramento and Feather rivers for three months. The work was under the supervision of Superintendent G. H. Lambson, Field Agent, E. W. Hunt and Mr. George Neale of the Sacramento District Office, who assisted this department with his knowledge of the movements of the shad, in making arrangements with

the fishermen to catch the fish, and in many other details. The run of shad was scattered, owing to the heavy fishing on the lower river which broke up the schools, and the extremely cold and roily water this spring and early summer caused by the melting of the deep snow that fell in the mountain regions last winter. The operations carried on were of considerable value in preparing for future shad hatching. Shad fry to the number of 872,000 were distributed in the Feather River.

The experiments in fertilizing and hatching a high percentage of the eggs and in keeping them free from fungus or bacterial infection were successful. The avoidance of bacterial infection is very important in propagating eggs of shad and striped bass. While no shipments were made East, experiments made in holding the eggs for shipment demonstrated that they can be successfully shipped to eastern hatcheries in shipping cases. Next season it will be possible to furnish Massachusetts and Connecticut with shad eggs for their hatcheries, as well as to hatch a liberal supply for our rivers.

The excessive fishing on the lower reaches of the Sacramento River, and in the bays, has greatly depleted the number of shad, and it is now necessary to hatch

in streams of Mendocino, Sonoma and Lake counties.

The distribution of fry from the Fort Seward Hatchery, Humboldt County, was completed August 20th. This was the first season's work at this station and the results are very satisfactory. The water proved to be all that was predicted for it when the station was first built. There was an ample supply of pure cold water during the warmest days, and the fish were unusually healthy and vigorous. One million one hundred and fifty-three thousand fry were distributed this season along the line of the Northwestern Pacific Railroad from Fort Seward Hatchery. Plans are being made to collect enough salmon eggs from Eel River near Fort Seward Hatchery to furnish that station with salmon eggs this season.



Fig. 72. Eel River near Steelhead, where salmon egg collecting station will be established in October. Photograph by S. Campbell.

and rear the shad if we desire to keep up the supply. Next season a well-equipped shad hatchery should be run on the Sacramento River and the Department of Fish Culture is ready to go ahead with the work.

TROUT FRY DISTRIBUTION, 1916.

Distribution of trout fry has been in progress at the different hatcheries since May. At Ukiah hatchery the fish were all planted by July 31st. Steelhead trout to the number of 445,000 were distributed

During July, the hatchery department made arrangements to establish a small hatchery and an egg collecting station at Lake Almanor Dam and one at Domingo Springs to collect rainbow trout eggs from Rice Creek, a tributary to the North Fork of the Feather River. This work is now under way and it is expected that it will be completed by the last of September. All the trap material, tanks, live cars, and egg collecting apparatus, will be stored ready for use early next spring.

The distribution of fry at the Almanor Hatchery was completed on July 31st.

Operations were very satisfactory. Over 200,000 rainbow trout fry were distributed in waters tributary to the North Fork of the Feather River in Lassen and Plumas counties. In addition to the fry reared and distributed from this station, 1,285,000 rainbow eggs were shipped to other stations, to be reared and distributed in other sections of the state.

Bear Valley Hatchery was closed on August 20th, after a successful season, considering the disadvantages that the crew worked under when the station was opened last March. Considerable dif-

Two distribution cars have been busy distributing the fish from Sisson station, which this season are being given a wider distribution than ever. When the season's work is over at Sisson station, nine million five hundred thousand large, fine trout fry will have been planted throughout the state.

The fry from Brookdale Hatchery were all distributed by August 1st, after a very successful season. Eight hundred seventy-five thousand fry were distributed throughout Santa Clara, Santa Cruz and Monterey counties.

Tallac hatchery was closed on August 1st. Owing to the warm and bad con-



Fig. 73. Exploring party on way to Rae Lakes Aug. 16, 1916. Photo by J. L. Von Blon.

ficulty was had in fertilizing the eggs, owing to the over retention of the eggs by the female trout, caused by the debris-closed mouths of the creeks which the fish enter to spawn. The crew had to remove the drifts and sand bars at the mouths of the creeks before the fish could enter. The fish were late in entering the streams where the traps were located and consequently the first fish to be taken were in poor condition for spawners. Seven hundred and fifty thousand fry were hatched and distributed in good condition in the waters of San Bernardino County. Deputy Malone ably assisted our men in the work of distribution. It is planned to operate this station on a larger scale next season.

dition of the water at this station, it is necessary to plant the fry early. The fry were given a wide distribution and will make a good showing in due time. The Tallac Hatchery should be removed to a site on Tallac Creek, as the present site on Taylor Creek is not suitable for holding fry to the desired age for planting. Plans are being considered to move this hatchery to a new site, where the fry can be held until late in the fall. A system of rearing tanks is proposed in addition to the hatchery, so that the fry can be reared to a larger size before planting than under the present system. It is hoped that this work may be completed before next season's operations begin.

The Tahoe Hatchery will run until October 15th, or later, to give the fry as much growth in the hatchery as possible before planting. The season at Tahoe has been a very successful one. In addition to the black-spotted trout fry usually hatched at this station, a quarter of a million rainbow from the Almanor egg collecting station were hatched. These will be distributed in places most suitable for this variety in the Tahoe region and Truckee River. This season there will be 3,000,000 trout fry distributed in the lakes and streams of the Tahoe district from the Tahoe hatcheries.

In addition to this lot, 110,000 eggs were shipped to the Verdi Hatchery where they were hatched and reared. The fry resulting from these eggs will be distributed in the streams and lakes in the vicinity of Lake Tahoe.

NEW SCREEN AND LADDER SURVEYS.

Among important investigations that have been made in the screen work during the past three months, is the investigation of canals in Monterey and Santa Cruz counties, and in the Sutter Basin. Reclamation districts No. 1500, No. 108, and



Fig. 74. Rae Lakes with Fin Dome in the background. An egg collecting station for the Inyo Hatchery will be established here. Photograph by R. D. Duke.

EASTERN BROOK TROUT FRY OBTAINED IN NEVADA.

Our supply of eastern brook trout fry was increased considerably this season, as the Nevada State Fish Commission did not operate their hatcheries and we were able to secure the privilege of collecting eggs from Marlett Lake, Nevada. The Carson City Hatchery was taken over by the California Fish and Game Commission and the Eastern brook trout eggs collected from Marlett Lake were shipped to the Carson hatchery, where they were eyed and prepared for shipment. At this station 690,000 eggs were collected, 527,000 of which were shipped to Sisson Hatchery to be hatched and reared for distribution in the streams of California.

No. 787 have been properly screened to prevent the passage of fish through the large siphon pipes. Screen investigations have also been carried on in Modoc, Amador, Tuolumne, Alpine, Mono and Inyo counties.

Surveys have been made for a new ladder over the Floriston Dam in the Truckee River, the property of the Crown-Willamette Paper Company; the Gibraltar Dam in San Ynez River, Santa Barbara County; the dam of the Santa Paula Water Works in Santa Paula Creek, Ventura County; the Meek Dam in San Lorenzo Creek, Alameda County; the Sunol Dam, Alameda Creek, Alameda County, and the Arroyo Del Valle Dam in Alameda County.

THE INYO HATCHERY.

Work on the Inyo Hatchery is progressing. The installation of the troughs and interior fixtures will be under way in a short time. The department of engineering expects to have the building completed at least by the first of November, and probably sooner. When this structure is completed it will be the finest hatchery building in the world, and will contain the most modern equipment. The output of this hatchery will supply all southern California, as well as the country as far north as the Yosemite Valley, with all the trout fry necessary to meet the population of the state for twenty-five years to come.

A survey of the Rae Lakes is now

being made for the purpose of collecting rainbow trout eggs to supply the Inyo Hatchery. The number of fish found on the spawning beds this season assures the needed supply. An egg collecting station is being constructed and all the necessary apparatus will be stored for early operations next season. The altitude of the Rae Lakes, 10,560 feet, makes it necessary for the station to be fully equipped this season, as it is impossible to transport anything to the lakes in the spring because of the deep snow, both in the passes leading to the lakes and in the lake basin. The preparations made will allow the crew to start collecting the eggs at the first breaking of the ice at the lakes without any unnecessary delay.



Fig. 75. The new Inyo Hatchery, looking east. Photograph by J. L. Von Blon.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

THE FISHERIES CONFERENCE AT SAN DIEGO.

At the San Diego meeting of the Pacific Division of the American Association for the Advancement of Science the afternoon of August 10th was set aside for a Fisheries Conference on the commercial and scientific aspects of the tuna industry.

Mr. A. J. Steele, President of the Premier Packing Company of San Diego, opened the discussion by reviewing the

rise of the tuna canning industry in California. From a modest beginning about five years ago the industry has grown until now there are about one and one-half million dollars invested. About four hundred fishing boats are employed and the pack for 1915 exceeded 300,000 cases. August is the principal fishing month, but in 1915 the best fishing was in November. The runs of albacore, or long-finned tuna, are erratic and there is little knowledge

of their habits or life history. The demand for canned tuna far surpasses the supply. This year the canneries have all prepared to put up a still larger pack, but the fish have been exceedingly slow in arriving. Those who have invested in the industry are very anxious to know

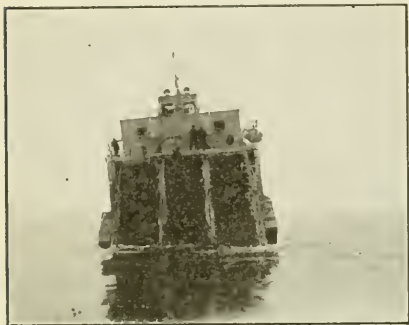


Fig. 76. Kelp cutter at work off Point Loma. Photographed by H. B. Nidever, taken July 14, 1916.

more about the fish upon which they are dependent. They want to know where it goes when it leaves the California coast, and more about its movements when in our waters. They want to know how they can increase their catch and if the catch needs to be limited if they are to expect a steady annual yield. They also want to know if it is possible by conservation measures to increase the annual yield. In conclusion Mr. Steele emphasized the desirability of a thorough scientific investigation of the whole subject and expressed the hope that the meeting would

result in the inauguration of a fuller investigation than has yet been attempted by the state or United States governments.

Mr. Johnson and Mr. Rankin told of the work of the United States Fisheries steamer Albatross in investigating the albacore. In the endeavor to determine the range of the albacore in Mexican waters it was impossible to locate schools of the fish early in the season. Data on the food and movements of this fish in California waters, however, has been obtained. Albacore appear in California with the coming of the small fish such as anchovies, sardines, or squid, although their food is not limited to these three varieties. Altogether fifteen species of fish have been found in their stomachs and at times the minute animal organisms known as plankton may form a large part of their food. In southern waters albacore were found feeding on several species of mollusks, crabs, devil fish and the larval forms of these. Albacore first appear between the Coronado Islands and San Clemente Island, and later move further north, but it was found impossible to follow the schools when they began to move. Some work has also been done to determine whether the cutting of the kelp by the kelp harvesters is likely to injure the fisheries. No evidence of fish eggs, fish or crawfish larvæ has been found in kelp being cut, although the leaves of the kelp on the beds to a depth of eight or ten feet were examined. Some small fish were found in the kelp but they were not the young of food fishes.

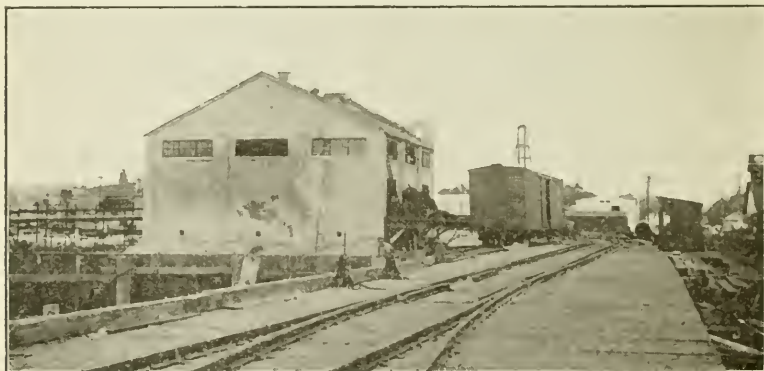


Fig. 77. Loading processed kelp at Swift Kelp Plant. After being processed, kelp is loaded in bulk into box cars and shipped to eastern plants. Photograph by H. B. Nidever, taken June 14, 1916.

While no evidence was found that cutting the kelp will injure the fish, the Bureau of Fisheries plans to continue the observations.

Dr. W. E. Ritter, director of the Scripps Institution for Biological Research, spoke at some length on the need of a scientific investigation of the tuna and kelp problems. This is a chance, he said, for scientific men to connect up their work directly with the economic development of these enterprises. With the heavy cutting of the kelp and with a demand for

posed of Dr. W. E. Ritter, Dr. B. W. Evermann, Dr. E. L. Michael, and Mr. N. B. Scofield.

A HEARING AT EUREKA.

On July 11, 1916, a public hearing was held in Eureka to give the people of Humboldt County an opportunity to discuss fish and game matters with representatives of the State Fish and Game Commission. The meeting was called by the Eureka Rod and Gun Club and the rooms of the Chamber of Commerce, where it

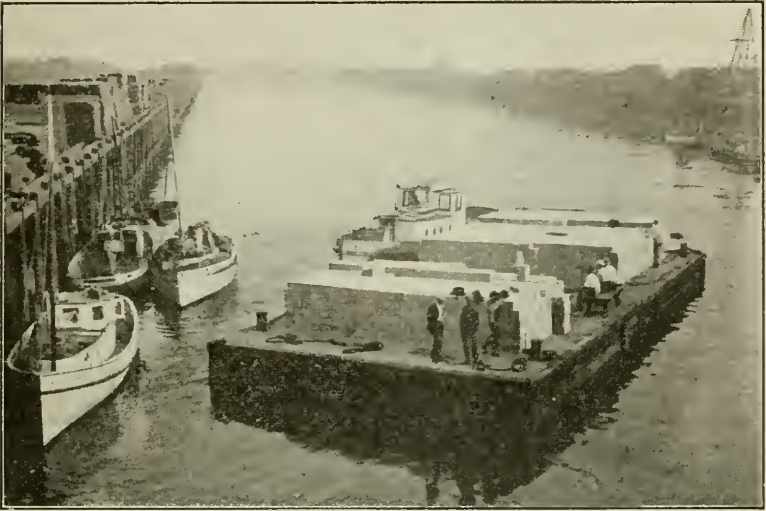


Fig. 78. A barge load of canned tuna in cases ready for shipment from San Pedro Tuna Cannery. Photograph by H. B. Nidever, taken August 14, 1916.

tuna greater than the supply, it is necessary to know whether these resources of the sea can stand the strain. Dr. Ritter was followed by C. L. Edwards, David Starr Jordan, B. W. Evermann, and G. H. Parker, each of whom agreed that a thorough scientific investigation should be made of the conditions affecting the kelp and fishing industries in order that these industries may be intelligently conserved. Dr. Ritter then proposed a resolution asking both the state and United States to institute such investigations and to appropriate enough money to carry them through. This resolution, the substance only of which is here given, was adopted by the society and a committee was appointed to bring about the investigations desired. This committee is com-

posed of the interest taken in fish and game by the people of Humboldt County. Senator Kehoe presided and opened the meeting by telling the people that this was their opportunity to make their wants known as to future fish and game legislation, for the recommendations of the Fish and Game Commission carry large weight with the legislature and the commission's representatives are here for the purpose of finding out what is wanted.

The Fish and Game Commission was represented by Mr. J. S. Hunter, Assistant Executive Officer, A. D. Ferguson, Field Agent, and N. B. Scofield, in charge Commercial Fisheries.

The first and most important subject taken up was that of crabs. The prin-

cipal speakers were Attorney L. F. Puter, Judge Hunter and Dr. W. E. Cook, each of whom stated that the people of Humboldt County are practically unanimous in wanting a state law which will take the place of their county ordinance, prohibiting the shipment of crabs from Humboldt County, or, in order that the law may conform to the present fish and game districts, to prohibit the shipment of crabs taken in Districts 7, 8 and 9.

Mr. Puter stated that the reason this law is desired is to prevent San Francisco crab fishermen from coming in and exterminating the crabs which the people of Humboldt County have tried so hard to protect. A fleet of these boats came up in the year 1908 and in four or five years the crabs in the bay and outside ocean waters had been nearly exterminated. The fishermen caught small and large crabs indiscriminately, and not only caught all the crabs in the bay, but operated drag nets within the bay in order to get fish for bait, with the result that even the fish were nearly exterminated. The county ordinance prohibiting the shipment of crabs from Humboldt County was passed in order to prevent the extermination of crabs and fish and has been in effective operation since December 3, 1912.

Under the protection of this ordinance crabs are again becoming fairly plentiful, but the state law allows crabs taken outside the harbor to be shipped from the county, and there is a question if the county ordinance can be enforced since it is in conflict with the state law as far as crabs outside the harbor are concerned. San Francisco crabs have become so scarce on account of overfishing that the fishermen are again trying to ply their trade in Humboldt County; if the crabs can not be protected outside the harbor these same fishermen will come in and exterminate them as they did a few years ago.

To show the rapid decline in the number of crabs caught, which it was stated was an index of their growing scarcity after the crab fishing boats began to operate in 1908, the speakers submitted the following record of the number of crabs shipped from the Port of Eureka from the year 1901 to 1912.

Crab Shipments from the Port of Eureka.

| | | |
|------|--------|--------|
| 1901 | 3,597 | dozens |
| 1902 | 16,827 | dozens |
| 1903 | 16,433 | dozens |
| 1904 | 15,147 | dozens |
| 1905 | 10,147 | dozens |
| 1906 | 12,941 | dozens |
| 1907 | 8,814 | dozens |
| 1908 | 39,974 | dozens |
| 1909 | 33,662 | dozens |
| 1910 | 8,908 | dozens |
| 1911 | 8,456 | dozens |
| 1912 | 1,954 | dozens |

These figures seemed to prove the contention very conclusively and the representatives of the Fish and Game Commission who had believed that the crabs of that district would stand much heavier fishing than at present, were almost convinced that the number of crabs had been greatly reduced. They pointed out, however, that the fisheries, all of them, should be developed as far as is consistent with their conservation, and that, as crabs are more numerous in the north, they should, theoretically, be able to stand heavier fishing in Humboldt County than at San Francisco; and that if the records of the crabs shipped from Eureka show their rapid decline in numbers, the decrease must have been due partly to the inadequate size limit, which was then 6 inches instead of 7 inches, and to the fact that in those years crab laws were not obeyed or enforced as they are now; also, that crabs are extremely abundant at the present time, and the presence of a large proportion of very large crabs shows that they will stand much heavier fishing than at present.

The vital reason for the decline in the catch after 1908—which was overlooked by all at the meeting—was that in the fall of 1909 a state law went into effect which established a crab preserve of the area within two miles of the inside shore line of Humboldt and Trinidad bays, and of the Pacific Ocean adjacent to these bays. Crabs could be taken for commercial purposes in the preserve only on Thursday of each week. Reducing the number of commercial fishing days to one a week made it unprofitable for the San Francisco crab boats to operate even on the one open day. This amply explains the reduced catch in the years 1910 and 1911. During those two years the mini-

imum size limit was 6 inches and the fishing was done mostly inside the bay where the larger sized crabs are usually scarce. In the late summer of 1911 the size limit was raised to 7 inches, which practically put a stop to the bay fishing as the larger crabs are found in the deeper water off shore. This change in the size limit fully accounts for the still further reduction in the number exported from Eureka in 1912.

It was pointed out by those representing the Commission that the present state law amply protects crabs; that with the 7 inches minimum size limit, even if every crab over 7 inches is caught, the females are all saved and a sufficient number of breeding males, as males mature at a size less than 6 inches. It has been found that with the continued catching of male crabs at San Francisco, that the males still equal the females in number, so that with the present state laws, none of the crab fisheries can be prosecuted beyond the natural yearly increase. When all the males above 7 inches are caught the fishermen will have to wait until more grow to be 7 inches, and as the males have all bred at least once, and most of them twice by the time they are 7 inches in diameter, it is absurd to talk of exterminating the crabs by fishing with the present law in force. The yearly production of legal-sized crabs for the San Francisco crab fishery is about 50,000 dozen, which is considerably more than were taken by some 60 boats in the best year in Humboldt County when the crabs were very plentiful.

Mr. W. H. H. Heckman and others spoke on the subject of better protection for the clams and the sea mussels of their district. The commercial clam of the region is the Washington clam which is canned so extensively at different places north of California. Humboldt Bay is at the southern end of the range of this clam and the general opinion was that it is in need of some protection. A closed season of four months each year was asked for and also a family limit of fifty clams per day. Mr. Scofield then pointed out that, on this coast at least, there is nothing in the idea that clams should be eaten only during the months that contain the letter "R"; that clams are at their best just before the spawning time and the best time for the closed season,

if a closed season is necessary, would be just after the spawning time when they are thin and not so good to eat. It was also pointed out that a minimum size limit is one of the best ways to protect clams. Fix a minimum size limit at which they have spawned at least once and then the beds can not be forced to yield more than their natural annual growth. The proper time for the closed season and the proper size limit, should be left to an expert to determine.

Mr. Heckman spoke in favor of prohibiting the shipment or canning, pickling or otherwise preserving mussels that abound along the rocky shores of Humboldt County. He said that while the mussels are plentiful now, canneries are likely to start at any time and exterminate them before protective legislation can be obtained. This argument was answered by the Fish and Game representatives present, with the statement that the sea mussels abound along almost the entire California coast, that they are about the most abundant and most valuable and at the same time the least used of our sea foods. They have a food value equal to oysters, they grow very rapidly and can be "farmed" and the production in this way vastly increased. They are especially fine when pickled and when canned do not have the tendency to become tough like many of the shell fish. The United States Bureau of Fisheries has been conducting an educational campaign to induce the people on the Atlantic coast to use the mussels that are now allowed to go to waste. The California Fish and Game Commission have been preparing to start a similar campaign here in California, for our shores can supply millions of pounds where now only a few hundred pounds are used. The few that have been canned on this coast as an experiment have not met with a ready sale and it is not likely that our mussel supply will be taxed for several years to come, even if an energetic campaign is conducted to induce people to eat this highly desirable food.

The subject of salmon protection in Mad River was touched upon. It was stated that the people of Arcata are in favor of closing the river to nets for a few years at least.

The trout season was discussed at some length. The three large lagoons, Big

Lagoon, Stone Lagoon and Fresh Water Lagoon, lying to the north of Humboldt Bay, formerly furnished rare sport when the season opened on April 1st, but now by the time the season opens on May 1st, the fish have begun to get soft and of poor quality and the people do not care for them. It was suggested that to change the trout season for all of District No. 1, might not be desirable but that a separate district could be made for these lagoons or for Humboldt and Del Norte counties.

It was explained by the commission's representatives that the opening of the trout season for District No. 1 was set for May 1st because it was the belief that many of the trout in that district had not finished spawning by April 1st; that this especially applied to the cut-throat trout found in the coast streams from Mad River north, which is the most desirable of the fish caught in these same lagoons. It was stated by Mr. Lee F. Wiley and others who are well posted on the ways of this particular trout that they spawn before April and even before the steelhead; but that a few may spawn almost any month in the year.

The advisability of stocking the large lagoons of the district with new varieties of fish such as bluegill sunfish, calico bass or black bass, was then discussed. It was stated by one or two present that they would like more varieties of trout in their streams and wanted to know if the Dolly Varden would not be a good trout to introduce. They were answered that the Dolly Varden is not a suitable fish on account of its cannibalistic tendencies and because it is inferior as a game fish to the other species of trout; that the commission has never stocked streams with this variety and would like to see it exterminated in the one or two streams in the state where it is native. The German brown trout was suggested as a good variety to introduce as it has already shown itself to be adapted to streams of that part of the state. The commission expects to experiment on the propagation of this variety next year.

Altogether the meeting was a very profitable one and those present learned something from the discussions and had their views broadened. Those representing the Fish and Game Commission certainly had an opportunity to learn what the Humboldt people want. All of the

requests brought up were noted with the arguments for and against so that all of the points may receive just consideration.

SAN FRANCISCO BAY OYSTERS.

Mr. McKnew of the Burlingame Oyster Company reports that oysters on the company's grounds are doing exceptionally well this year. He states that seed oysters have in the last year shown a wonderful growth, and that they are fat and in fine condition. The oysters which are brought from the Atlantic coast as seed oysters are shipped out in cold storage, taking about fifteen days for the trip. They are, at the time of planting, from $\frac{1}{2}$ inch to 1 inch in length, and on their arrival are planted in beds where they are left for three to four years. They are then tonged up, boxed and shipped to the markets. Mr. McKnew states that the oysters near Burlingame Point have shown an exceptional growth: Oysters planted here in May, 1915, which ran about 8,000 to 10,000 to the bushel, in August, 1916, averaged from 1,100 to 1,200 to the bushel. The oyster planted in San Francisco bay has a great advantage over the eastern oyster, and over oysters farther north, for the milder temperature during the winter months allows more time for growth.

CHLORINATING OYSTERS.

In the July bulletin of the California State Board of Health we are told that many cities chlorinate their water supply; that 22 municipalities in California, representing a population of a million people, now disinfect their water supply by this method. What is good for humans seems also to be good for the oyster wherever it is compelled to use polluted water. Experiments conducted by the sanitary chemist for the state of Maryland, have demonstrated that a practical application of this method can be made to oysters. At feeding temperatures large volumes of water, from 25 to 50 gallons, are passed through the siphon of each oyster and over its gills. The food captured by the oyster from this stream of water passing over the gills passes through its gastrointestinal system within five hours, so that only a very short time is required for its artificial purification by the chlorinating method. There appears to be no

reason why this method can not also be applied to clams and other shellfish. This appears to be an extremely important discovery, for oysters and clams grow best in bays and estuaries that receive the fresh water of some stream or river. These are the locations that are most frequently subject to pollution. It has frequently happened that oyster and clam beds have had to be abandoned temporarily, and in some cases permanently, because of the very real danger of spreading typhoid and other water-borne diseases. If the chlorination method will work, and we are assured it will, there will be no need to condemn any oyster or clam bed. It will only be necessary to require that the oysters or clams be chlorinated. In the process the oysters are placed in water that has been treated with a trace of calcium hypochlorite, in the same proportion as is used in drinking water. Treatment requires about six hours and it is stated that the oysters show no change in condition and it is impossible to distinguish any difference in flavor between treated and untreated ones.

MARKED SALMON LIBERATED.

On February 15, 1916, 3,500 marked yearling Quinnat salmon were liberated in the Klamath River at Klamathon. They were hatched at the Sisson Hatchery from eggs taken on Butte Creek in November, 1914. Each was marked by removing the left ventral and the adipose fin. It is expected that a few of these will be recovered in the Klamath River in 1917 as male grilse, and that both males and females will be taken in 1918, 1919 and 1920 as 4, 5 and 6-year-old fish.

AN AQUARIUM FOR SAN FRANCISCO.

The San Francisco Art Preservation League, which has done such good work in preserving some of the beauties of the Panama-Pacific International Exposition, has with the aid of the State Fish and Game Commission, opened the Aquarium in the Hawaiian Building. The Aquarium has been converted from a salt water to a fresh water system, and the fresh water fishes of California are being shown. A modest beginning has been made, which it is hoped will awaken an interest that will in time lead to San Francisco having an aquarium equaling the celebrated New York Aquarium. San Francisco is much

more favorably situated for an aquarium than is New York, for here we have a much richer and more beautiful sea fauna from which to draw.

CLAMS IN SAN FRANCISCO BAY.

On the shore of Islais Bay, an area of tidal flat on the western shore of San Francisco Bay at the mouth of Islais Creek, clams have been dug to supply the San Francisco market since the early seventies. This tidal flat was formerly almost a mile in length from north to south and at low tide about half a mile in width. The bottom was black mud of unknown depth, composed of alluvial washings carried down by Islais Creek from the old Spanish Potrero Nuevo.

The shore line of this tidal flat was inhabited by a large number of Chinese engaged in the occupation of shrimp fishing and clam digging and it is with the clams dug by these Chinese that the writer would deal at this time.

Up to 1876 but one species of clam was found in any quantity by these diggers and that was a white-shelled variety (*Macoma nasuta*), about two and one half inches in greatest length, with a noticeable flattening of the curve of the shell from the hinge toward the apertures from which the siphons issue. The siphons were very small, being less than 1/16 of an inch in diameter and very delicate in structure.

The *modus operandi* of these clam diggers was as follows: Provided with a board 18 inches wide and four feet long with a strip one inch thick nailed across each end and with a Chinese basket set thereon, the digger waded out on the mud flat at low tide, pushing the basket on its sled board ahead of him. On arriving at a suitable place the clam digger pushed his hands and arms, held vertically in front of him, elbow deep into the soft mud, and then turned up the mud toward himself; straining this mud through his fingers he found the clams, which were placed in the basket. This was continued until the basket was full or the flood tide prevented further digging.

Upon arriving at camp the diggers at once placed the clams in shallow, watertight boxes about 18 inches wide, 10 inches deep, and 8 feet long; in one end

of the bottom of each box a hole was bored for draining. A layer of clams 3 or 4 inches deep was placed in each box. The box was then partially filled with clean water from the bay, the water was changed at each high tide, and after 36 or 48 hours the clams were marketed. This clean water bath was intended to allow the clams to void all mud and sand contained in the stomach and render the clams edible.

In 1876 the writer first noticed that a few clams of another species (since identified as *Mya arenaria*) were being found. This is the soft-shelled clam now on sale in the city markets. These have gradually increased in number until the native clam *Macoma* has been entirely displaced.

The soft-shelled clam was originally introduced by the oyster growers with their spat imported from the Atlantic Coast during the decade ending with 1870. It gradually spread over the tidal flats of San Francisco Bay, and is now abundant in this region.—JOHN P. FISHER.

CALICO BASS, SHARP-EARED BASS, AND BLUEGILL SUNFISH.

Calico bass, sharp-eared bass and bluegill sunfish were introduced into California waters several years ago and have now become fairly plentiful in several localities. Since these fish are of the greatest food and game value, and since they are but little known, the following information is issued so that these excellent fish may occupy the place in the public esteem which they deserve.

All of these fish belong to the family Centrarchidae, a family of North American fresh water fishes, to which belong the sunfish, sharp-eared bass (crappies), Sacramento perch and black bass. The two species: *Pomoxis annularis* (crappie or sharp-eared bass) and *Pomoxis sparoides* (calico bass or strawberry bass) are easily distinguished from the other California members of the family by the size of the dorsal fins which are scarcely larger than the anal fin (by the size of the fin is meant the length of the base of the fin). In the other members of the family the anal fin is much smaller than the dorsal. The two may also be distinguished by the following characters.

Pomoxis annularis: Dorsal spines 6, rarely 5; tips of the ventral fins not reaching to the front of the anal fin.

Pomoxis sparoides: Dorsal spines 7, rarely 8; tips of the ventral fins reaching beyond the front of the anal fin.

These two fish are confounded by most anglers, even in the Middle West where they are best known.

Lepomis pallidus (bluegill sunfish) may be identified by the following characters: characteristic sunfish shape; dorsal fin much larger than the anal; small mouth; rather long, velvety black, opercular flap or "ear"; bluish cheek and gill cover; large, dark blotch on the last rays of the dorsal fin and a similar, but fainter one, on the anal fin.

The sharp-eared bass is better known as "crappie," but as this name is apt to prejudice many against the fish, it is suggested that deputies call it the "sharp ear" and induce the public to so call it. The sharp-ear and calico bass are both well adapted to the lower Sacramento and San Joaquin county and are likely to become quite numerous and of great importance as game and food fish.

The three species have been introduced into the waters of California as follows:

LOCALITY.

Bluegill sunfish—Honey Lake, Lassen County; Lake Vera, Nevada County; Brushy Lake, Sacramento County; Plumas Lake, Yuba County; San Joaquin River; Feather River; Clear Lake, Lake County; Kings River; Kern River; Sutterville Lake, Sacramento County; Washington Lake, Yolo County; Freeman River; Lake Cuyamaca; Elsinore Lake; Bolsa Chico River; Watsonville Lagoon.

Sharp-eared Bass (crappie)—Honey Lake, Lassen County; Lake Vera, Nevada County; Brushy Lake, Sacramento County; Plumas Lake, Yuba County; San Joaquin River; Feather River; Clear Lake, Lake County; Kings River; Kern River; Sutterville Lake, Sacramento County; Washington Lake, Yolo County; Freeman River; Lake Cuyamaca; Elsinore Lake.

Calico Bass (strawberry bass)—Lake Cuyamaca.

N. B.—It appears that calico bass were mixed with the shipments of crappie, so that wherever plants of crappie were made we can expect to find calico bass.—N. B. SCOTFIELD.

CONSERVATION IN OTHER STATES.

CONSERVATION COSTS LITTLE IN NEW YORK.

Conservation has cost the people of New York state this year only \$133,933.89. Actual expenditures were \$702,124.66, but returns to the commission in cash or its equivalent, including the value of the output of the fish hatcheries, was \$568,290.77. With a return of more than 80 per cent of the amount expended, it is evident that the practice of conservation in this state is not a financial drain on the people. Indeed, if account is taken of the value of the forests saved, of the food values of the fish and game that finally reach the tables of the people, and of the stream flow maintained through preservation of the forests, it will be found that conservation, like saving among individuals, yields a profit out of all proportion to the sacrifice involved. In addition to the above returns must be considered all of the æsthetic and recreational values of forest and stream, of hunting and fishing.—G. D. PRATT, in *American Game Protective Association Bulletin*, Vol. 5, No. 2, June 1, 1916.

LOUISIANA REMODELS CONSERVATION COMMISSION.

The governor of Louisiana has appointed M. L. Alexander Commissioner of Conservation of the new Department of Conservation created by the legislature of that state during its last session.

The Department of Conservation supersedes the former Conservation Commission of Louisiana which was composed of three commissioners. The new department of state has but one head, the commissioner. Mr. Alexander was the president of the former commission and his appointment to the head of the new conservation body is in the nature of a recognition of his efficient management of the old board.

UNITED ANGLERS' LEAGUE.

The United Anglers' League is an incorporated body with headquarters in the World Building Auditorium, New York, which for twelve years has been working in the interests of all fishermen. A monthly bulletin is issued by the league which contains many items of interest to

anglers, especially to those of New York State. The May bulletin advocates federal control of the fisheries. As a makeshift New York state is attempting to give control of the marine fisheries to the state government until such time as the national government shall take over the question.

As an incentive to join the organization some of the following statements are made:

"You, no doubt, have been asking, and your sport-loving brother anglers also are wondering, why the fishing of late years is becoming poorer and poorer, and then why you have to go farther and farther away from your favorite 'old spots' to get any kind of satisfaction.

"You want to go fishing—and it is your bounden duty to your health. You must have good health, also you must be reasonably sure you are to have a good day's outing. Besides, you want to come back reinforced for your business duties.

"The congested condition of city life forces you to look to the water for recreation. More and more the waters must be used—more and more sea-food must be obtained. On the water alone you catch your appetite and its fulfillment.

"Civilization both crowds us and prompts us to get together and protect our common interests. Your friends, the United Anglers' League, have been doing this for you for the past twelve years.

"The fish trust is well organized. Organization is our only salvation. Political friends will yield to a united body. Trees, buffalo, wild pigeons have gone for lack of united action. Shall we lose our fish?"

GAME WARDENS IN WISCONSIN FURNISHED MOTORCYCLES.

The Wisconsin Conservation Commission has equipped 25 of its wardens with motorcycles. Not only will the use of these machines materially reduce transportation expenses, but it will enable the wardens to cover and patrol their districts more thoroughly.

PENNSYLVANIA TRIES THE BOUNTY SYSTEM.

Pennsylvania has been offering a bounty on wildcats, foxes, mink, and weasels. The amount expended per month has increased from about \$1,000 to \$12,411 paid out in January, 1916. Between April 1, 1915, and April 30,

1916, bounties were paid on 778 wildcats, 4,663 gray foxes, 4,763 red foxes, 3,975 mink, and 27,114 weasels, which represented an outlay of \$54,609.

MISSISSIPPI ESTABLISHES GAME COMMISSION.

The State of Mississippi has at last decided to conserve its fish and game resources. A Department of Game and Fish has been created and a State Fish

and Game Commissioner has been appointed temporarily by the Governor. The new law provides that in 1919 the State Game and Fish Commissioner shall be elected by the qualified electors of the state at large. Provision is made for the hunting license system, and closed seasons and limits are set. The limit on deer is an unusually large one. No one person is allowed to kill more than one a day, but five are allowed during a season.

LIFE HISTORY NOTES.

BAND-TAILED PIGEONS BRED IN CAPTIVITY.

In September, 1915, through the courtesy of Mr. Wm. L. Finley, State Biologist of Oregon, formerly with the Oregon Fish and Game Commission, and Mr. Ernest Schaeffle, Secretary of the California Fish and Game Commission, I received six adult specimens of the band-tailed pigeon (*Columba fasciata*). No results were obtained in breeding these birds in 1915, but this year (1916), they have nested upon three separate occasions.

On June 11th I discovered one egg which had been laid in an abandoned nest of the Nicobar pigeon, and immediately removed the egg and placed it under a pair of domestic pigeons. On June 30th this egg was hatched and the young squab thrived under the care of its foster parents until it was ten days old, when, much to my regret, it jumped out of its nest in the evening and was killed.

Apparently the same pair of birds which had produced the first egg began to build a nest immediately after the egg was taken, and on June 16th they deposited another egg which was duly hatched and the young raised to maturity. The young bird is now full grown but lacks the white band on the neck and the dark band on the tail. The plumage in general seems to be somewhat darker than that of the adult bird. Before the last mentioned squab left its nest, the old bird deposited another egg in the same nest. This egg hatched on August 15th and unless the bird meets with some accident, it will soon be feathered and ready to fly.

When the birds were first received from Oregon they were exceedingly wild,

but rapidly became gentle and are now quite tame. I believe that it is possible to attain considerable success in rearing these birds, if suitable quarters are provided and proper attention given to feeding and to nesting facilities.—H. R. NOACK.

BAND-TAILED PIGEONS ALLEGED DESTROYERS OF GRAIN.

During the spring of 1916 there were thousands of band-tailed pigeons here; in fact, I have not seen so many in the last ten years. There was some complaint that they fed upon newly sown grain. I made some investigation and am inclined to think they only eat what grain is left upon the ground. I do not think they pull up or scratch what is covered.

On May 6th, in response to a complaint from Mr. Laurensen that pigeons were eating up all of his grain as fast as he sowed it, I made a trip to Mad River. I found thousands of pigeons but could not see that they were doing any particular damage, as they were only picking up the grain that was not covered.—EARL P. BARNES.

THE SOOTY GROUSE IN TRINITY COUNTY.

Sooty grouse (*Dendragapus obscurus fuliginosus*) are found in the high timbered regions throughout the Trinity National Forest, but are comparatively scarce through the eastern portion, being more plentiful west of the south fork of Trinity River, particularly on the west slope of the South Fork Mountain, on Grouse Mountain and Grizzly Mountain.

The dates of mating and nesting in the spring being influenced by the advent of warm days, appear to vary con-

siderably with the season. Mating begins in the latter part of February or first of March: at this season the male struts not unlike a turkey gobbler, and produces a sound with his throat called hooting, which can be heard for long distances. This hooting may be heard as late as May or June. The time of nesting is variously reported from different districts of the forest: the earliest date for the beginning of nesting being in March, and the latest date in June, some broods hatching as late as the middle of July, due perhaps, to the fact that many of the nests are destroyed, and a second nesting takes place. The nests are made on the ground, in tall grass or in clumps of brush or young trees. The broods vary in number from eight to eighteen.

During the winter months sooty grouse are seldom seen on the ground. At this season they live in the fir trees on the high mountains, and feed on fir buds. During February they begin to move down to the more open areas at lower elevations, where they find grass and clover coming up, and where conditions are suitable for nesting. During the spring and early summer months their food consists of tender grasses and grass seeds, buds and insects, including grasshoppers; they are also very fond of grain. In the late summer and early fall grouse are found largely around springs and moist places. Their food at this season

consists of seeds, berries and insects. With the return of cold weather they return to the fir forests on the high mountains and ridges.—J. D. COFFMAN.

COYOTE KILLED WHILE IN PURSUIT OF A DEER.

While hunting deer near Landslide Meadow on the morning of August 20th, Messrs. Eugene Brigger and Frank Harrel heard the bleating of a young deer which soon came into sight around some brush, with a coyote in pursuit, almost ready to seize it. Mr. Brigger made a lucky shot with his rifle, brought down the coyote, and without doubt saved the deer's life. The coyote was an old female which showed evidence of having a litter of pups dependent upon her.—WM. M. CLINGAN.

MOUNTAIN SHEEP SEEN IN OAK CREEK PASS.

On July 11, 1916, while on a trip to Rae Lakes, when about five miles by trail from the new Inyo Hatchery and about one and a half miles from Oak Creek Pass, Mr. Frank Shebley, Mr. Carl Walters, and myself, saw 22 mountain sheep (*Ovis canadensis sierræ*). One ewe, which had two kids about a month old, was seen to jump out of low brush not more than 25 yards from us.—E. H. OBER.

UNITED STATES FOREST SERVICE CO-OPERATION.

L. H. WHITEMAN, Editor.

PREDATORY ANIMALS BEING KILLED ON CALIFORNIA NATIONAL FOREST.

The United States Biological Survey has two men employed hunting and trapping predatory animals on the California National Forest. They have had fair luck considering the time of year, having killed ten coyotes, one mountain lion and a number of smaller varmints.

SWAT THE COYOTE.

Much has been written about the depredations of the mountain lion on deer, and it is probable that each mature mountain lion in California kills from one to three deer weekly. The lion, however, does not thrive in civilization, and is becoming scarce except in remote places. A

much greater menace to deer as well as to all other game is the furtive coyote. The lion springs upon the biggest buck in the woods; carries him, kicking and struggling, as far as his pantherishness sees fit, and plays with him as a cat with a mouse; then kills him, often by holding him flat on his side while eating into his vitals. Finally it hides the remains very carefully by scratching up all of the litter in a radius of ten feet, and making a neat mound which seldom fails to attract the attention of the passerby. Thus the story of the killing gets to the papers and is scattered to the four winds.

On the other hand, there is nothing of the spectacular about the coyote. His work is done in an insidious manner,

without publicity or unnecessary grandstand plays. He readily adapts himself to changed conditions and, where constant warfare is not waged against him, will live and increase in thickly settled country. All mountainous parts of California are more or less infested with this pest, and while their most noticeable depredations are against sheep, hogs, and poultry, they take a constant and heavy toll from every kind of wild life, from cottontails and quail to deer. No bird's nest within six feet of the ground is safe if one of these prowlers is about, and there are many instances of organized hands of from two to six coyotes running down and killing large, antlered bucks.

In winters of heavy snowfall like the one just past, deer in large numbers become easy victims of coyotes. The deer are generally able to move about enough to secure food, but are helpless if attacked by coyotes, since they break through the crust when they attempt to escape, and soon become exhausted.

Giving venison a cash value of twenty cents per pound, it is a conservative estimate that \$100,000 worth of venison is destroyed annually by coyotes. This, if coupled with the more tangible loss of sheep, hogs, and poultry, would make an alarming total.

This economic waste has been borne more or less passively by the people of the state in the past, but the recent outbreak of rabies among coyotes, which constitutes a serious menace to all branches of the stock industry as well as to human life, puts a new face on the matter. The coyote must be exterminated, and an organized, statewide campaign should be started at once which should include the state and federal officers of public health, all branches of the live stock industry, poultry raisers, and the State Fish and Game Commission.—B. H. MACE.

QUAIL SEASON.

Attention has been called in previous reports to the desirability of having the season on mountain and valley quail the same. Observations made during a recent trip on the Sierra Forest prove that the same conditions exist in the Sierras. Where the two species of quail occupy the same region it is impossible to

prevent unintentional violations of the law when the season on one is open and on the other is closed. A season properly applicable to both is much to be preferred to a law conducive to unintentional violations.—J. D. COFFMAN.

WILD PIGEONS ACCUSED OF CARRYING HOG CHOLERA.

It is believed by some of the stockmen in the vicinity of Tule River, Sequoia National Forest, that wild pigeons carried hog cholera from the valley and infected the region. The pigeons were known to have been feeding on acorns in the valley in cholera-infected areas, and when they migrated to the Tule River country, where there was a heavy acorn crop, cholera immediately broke out there.—FRANK P. CUNNINGHAM.

IMPROVED CONDITIONS IN CALIFORNIA NATIONAL FOREST.

In spite of the fact that there have been from two to three times the number of hunters in the California National Forest during the present open season than ever before, there has not been one accident and no dead does have been found in the forest. This is due largely to the "no spike" law. In the good old days when the inadequate game laws then in existence were a dead letter in the mountains, it was a common practice for hunters to blaze away at every movement or noise in the brush, and fatal accidents were of frequent occurrence. Later, as the game wardens became more numerous and active, doe killing became so unpopular that a hunter who brought one to camp was "kidded" unmercifully by his companions, so that the majority of hunters gave up the practice.

There were still many, however, who, in their desire to get meat, would persuade themselves that they saw "spikes" on anything that moved in the woods, and, finding that they had killed a doe, would leave it in the woods rather than face the ridicule of the camp. Under the present law, requiring that any deer killed must be at least a forked-horn, there is no excuse for the hunter who kills a doe or human being.

Steelhead fishing has been unusually good in the north fork of middle fork of Eel River, in the California National

Forest. This is one of the few streams of the state where steelhead trout up to ten pounds in weight remain all summer.

TWO BIRDS WITH ONE STONE.

Not a ground squirrel or a rattlesnake was found on the California Forest recently while the rangers were running a fire line through a region heretofore replete with these animals. The absence of squirrels was rightly attributed to the work during recent years by the poison squads of the United States Biological Survey. The scarcity of rattlers is a mystery, unless it be that the poisoned squirrels are instrumental in poisoning the snakes.

TROUT TO BE RESCUED FROM STREAMS.

At the suggestion of Forest Ranger Bert Stephenson of the Cleveland National Forest, a fund is being raised in order that trout imprisoned in the rapidly drying pools of some of the mountain streams may be rescued. According to Ranger Stephenson, between 4,000 and 5,000 trout can be saved if proper steps are taken. Although there are many places in Orange County trout streams where trout have been caught in pools, yet most of the fish in danger are located in the San Juan Hot Springs and the Trabuco Canyons.

WILD LIFE IN RELATION TO AGRICULTURE.

BLACKBIRDS DAMAGE CROPS IN IMPERIAL VALLEY.

Mr. Paul Dougherty, the Farm Advisor of Imperial County informs us that blackbirds, including the bicolored, yellow-headed and Brewer varieties, seriously injure Egyptian corn in the Imperial Valley. When the corn is ripening in the fall large numbers of migratory blackbirds arrive from the Great Basin and, joining force with the few resident birds, attack the cornfields. Owing to the fact that little of the southeastern desert affords proper food for these immigrants, there is a concentration of the birds in areas where cultivated crops are grown. Hence the problem is a serious one. The resident bicolored blackbirds are not abundant enough to seriously endanger crops, but the host of migratory birds which appear in the fall renders the growing of Egyptian corn almost hopeless. Means of controlling these birds which actually do become a pest under these circumstances are difficult to find. The only method which can be recommended is that of shooting, a method which is expensive and not always entirely successful.

Fortunately the game laws of our state provide that the owner or tenant of premises may kill such non-game birds as may be destroying crops, thus making it possible to meet such a problem as this, where a bird showing no strongly positive value to agriculture becomes a menace to growing crops.

RABBITS DAMAGE CROPS IN SAN DIEGO COUNTY.

Constant complaint has been received regarding the depredations of rabbits in San Diego County. On the request of Mr. Weinland, the farm advisor of that county, I investigated conditions on August 11 and 12, 1916.

At El Cajon, on the ranch of Mr. C. B. Purnall, I was shown small orchard trees such as peaches and almonds, which had been severely damaged by rabbits, in spite of the fact that a rabbit fence partially enclosed the small orchard. In many instances trees had been killed, and many other trees were forced to sprout out below the graft because rabbits had continually cut off the growing shoots and had barked the trees lower down. A small camphor tree which had been killed was taken as evidence. More small fig trees were only saved from damage by protecting them with tin cans. Tomatoes planted last year were entirely destroyed by rabbits; hubbard squashes met the same fate. Mr. Purnall reported that both cottontail and jack rabbits were responsible for the damage, but that cottontails were most numerous. Evidence in the form of tracks proved Mr. Purnall's contention to be correct.

Mr. F. McKenney reported the loss of five acres of sudan grass. Mr. H. H. Kessler showed me extensive damage to beans, corn, and sudan grass. Beans near the edge of the field had been eaten to the ground, as had also the grain and

sudan grass. Mr. F. Springstead of El Cajon reported great damage to peppers, stating that at least one-third of his planting of last year had been destroyed by rabbits.

At Ramona J. F. Howarth lost the whole of his barley crop last year, due to the ravages of rabbits. He showed me damage to melons, milo maize, and

large areas of uncultivated land adjacent to ranches make ideal breeding grounds for these animals. Rabbits from large tracts of brush land concentrate on the relatively narrow strips of cultivated land and as a consequence the damage is considerable. Damage appears to be at a maximum in the early spring when the first green shoots appear.



Fig. 79. A corner of a field of milo maize on the ranch of J. Howarth, Ramona, San Diego County, showing damage by rabbits. The hills in the background form an excellent breeding place for rabbits, and these animals seriously damage growing crops.

sudan grass (see figs. 79 and 80). Apparently jack rabbits were doing most damage in this locality. Mr. William Dukes, a near neighbor, reported damage to alfalfa. Like complaints were received from many other ranchers.

Dr. J. Grinnell, who investigated conditions in the vicinity of San Onofre, reports that he found an area of about fifteen to twenty-five yards along the sides of lima bean fields near brush entirely cleaned by rabbits. Rabbit and wood rat tracks were to be found all over the bean fields, and search disclosed many bitten and empty bean pods and cut-off stems.

The investigation showed that conditions in San Diego County are altogether different from those in other parts of the state. Both cottontail, brush and jack rabbits are very abundant, and the

Although a few of the men interviewed seem to desire the rabbits be given no protection, yet it would appear that the present law is more effective than a law taking protection from these animals. The present law concentrates hunting on the ranches where permission can be obtained to hunt in case rabbits are damaging crops. A law giving no protection to rabbits would distribute hunting, and most gunners would hunt away from ranches rather than on them.

There is no doubt but that ranchers in certain localities in San Diego County need some means of protecting their crops. In my mind the best solution of the problem would be to allow ranchers who are being troubled to use poison. The poison used for rabbits is not dangerous to other game mammals or to birds, nor would the use of poison endanger the

breeding stock of rabbits in San Diego County.

According to the United States Department of Agriculture:

"In localities where cottontails are sufficiently abundant to be a continual menace, the safest and most nearly permanent method of securing immunity from their ravages is to fence against them. It has been found that woven wire netting of $1\frac{1}{2}$ -inch mesh and 30 inches high will exclude rabbits, provided

"The poisoned oats, prunings, or green baits are dropped along rabbit trails or in places frequented by the rabbits, care being exercised in placing them to prevent any possible injury to live stock.

"The following poisoned wash has proved highly satisfactory in the West and promises to be one of the most popular methods of protecting trees from rabbits:

"Poisoned tree wash. Dissolve one ounce of strychnine sulphate in three

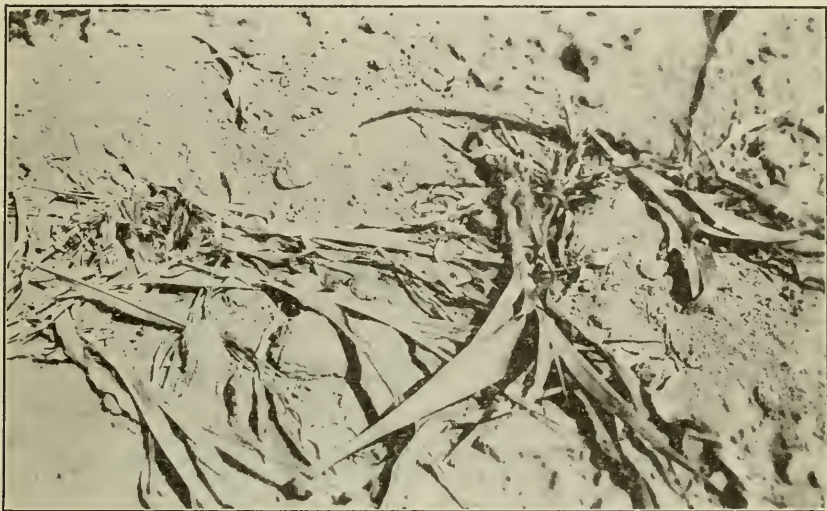


Fig. 80. A close view of milo maize stalks gnawed by rabbits. Photograph taken on ranch of J. Howarth, Ramona, San Diego County, Cal., August 12, 1916.

that the lower border of the fence is buried 5 or 6 inches below the surface of the ground. In cases where a small number of trees are concerned, a cylinder of similar wire netting around each tree, if so fastened that it can not be pushed up close against the tree, serves the purpose more economically.

"Poisoned green baits. Cut up a supply of carrots, parsnips, apples, or other similar baits into cubes one-half to one inch in diameter. Insert in each a small quantity of powdered strychnine or a small strychnine crystal. When a larger quantity is to be prepared, the powdered strychnine can be dusted over the bait by means of a salt shaker, in the proportion of one-eighth ounce of strychnine to two quarts of the baits.

quarts of boiling water and add one-half pint of laundry starch, previously dissolved in one pint of cold water. Boil this mixture until it becomes a clear paste. Add one ounce of glycerin and stir thoroughly. When sufficiently cool apply to the trunks of trees with a paint brush. Rabbits that gnaw the bark will be killed before the tree is injured.

"Many other repellent tree washes have been used with varying success." The application of blood from a killed animal or of a spray made of blood meal is a well-known repellent.

The above means can all be recommended to the rancher but the cost of fencing is often prohibitive and the tree wash is only temporarily effective. Hence the more economical and permanently ef-

fective method, that of poison, would appear to best afford relief to the ranchers of San Diego County.—H. C. BRYANT.

GULLS DESTROY MICE.

Gulls, when visiting the rivers and marshes of the interior valleys of California, do not appear to be wholly scavengers or piscivorous. A California gull (*Larus californicus*) taken on March 12, 1912, along the San Joaquin River near Mendota, Fresno County, was presented to me. Upon dissection I was astonished to find its stomach filled with common

black crickets and three whole field mice.—H. C. OHL.

SPREAD OF THE STARLING IN NEW ENGLAND.

According to information received by Mr. E. H. Forbush, State Ornithologist of Massachusetts, the starling has now spread to every county in Massachusetts and to every state in New England. Already much complaint has been made of its depredations in orchards.—*Current Items of Interest*, April 11, 1916.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

June 1, 1916 to August 31, 1916.

| Offense | Number of arrests | Fines imposed |
|--|-------------------|---------------|
| <i>Game.</i> | | |
| Hunting without license..... | 32 | \$450 00 |
| Deer, close season, killing or possession..... | 29 | 640 00 |
| Female deer, spiked bucks, killing or possession..... | 15 | 600 00 |
| Failure to retain deer horns..... | 1 | ----- |
| Nongame birds, killing or possession..... | 1 | 10 00 |
| Cottontail rabbits, close season, killing or possession..... | 10 | 135 00 |
| Ducks, close season, killing or possession..... | 5 | 500 00 |
| Quail, close season, killing or possession..... | 5 | 125 00 |
| Doves, close season, killing or possession..... | 4 | 100 00 |
| Wild pigeons, close season, killing or possession..... | 3 | 50 00 |
| Grouse, close season, killing or possession..... | 4 | 50 00 |
| Collecting bird eggs without proper permit..... | 1 | 15 00 |
| Antelope, possession..... | 1 | ----- |
| Issuing receipt instead of license..... | 1 | ----- |
| Total game violations..... | 112 | \$2,675 00 |
| <i>Fish.</i> | | |
| Angling without license..... | 43 | \$775 00 |
| Refusing to show angling license to deputy on demand..... | 1 | 50 00 |
| Fishing for profit without license..... | 36 | 300 00 |
| Failure to make report of fish received..... | 2 | 10 00 |
| Trout, close season, taking or possession..... | 3 | 75 00 |
| Trout, excess bag limit..... | 7 | 75 00 |
| Illegal fishing apparatus..... | 15 | 830 00 |
| Undersized crabs, taking or possession..... | 7 | 85 00 |
| Abalones, undersized, excess bag limit..... | 6 | 120 00 |
| Dynamiting fish..... | 3 | 200 00 |
| Pollution..... | 1 | ----- |
| Clams, undersized, excess bag limit..... | 9 | 50 00 |
| Dried California shrimp in possession..... | 2 | ----- |
| Black bass, undersized, possession..... | 3 | 60 00 |
| Lobsters, in possession, close season..... | 1 | 20 00 |
| Undersized catfish, sale..... | 1 | 20 00 |
| Striped bass, underweight..... | 1 | ----- |
| Total fish violations..... | 141 | \$2,670 00 |
| Grand total fish and game violations..... | 253 | \$5,345 00 |

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

June 1, 1916 to August 31, 1916.

| | | |
|-----------------------------|-------|------------|
| <i>Game.</i> | | |
| Deer meat..... | 522 | pounds |
| Deer hides..... | 3 | ----- |
| Rabbits..... | 28 | ----- |
| Ducks..... | 22 | ----- |
| Doves..... | 5 | ----- |
| Quail..... | 3 | ----- |
| Miscellaneous game..... | 10 | ----- |
| <i>Fish.</i> | | |
| Striped bass..... | 1,080 | 1/2 pounds |
| Trout..... | 682 | pounds |
| Salmon..... | 120 | pounds |
| Dried shrimp..... | 275 | pounds |
| Crabs..... | 669 | ----- |
| Clams..... | 549 | ----- |
| Abalones..... | 82 | ----- |
| Lobsters..... | 4 | ----- |
| Miscellaneous fish..... | 106 | pounds |
| Illegal nets and lines..... | 6 | ----- |
| <i>Searches.</i> | | |
| Illegal fish and game..... | 85 | ----- |

Statement of Expenditures for the Months of May and June, 1916.

| | May | June |
|--|-------------|-------------|
| General administration, salaries, traveling expenses, rentals, supplies, etc. | \$2,218 22 | \$2,219 97 |
| San Francisco district, salaries, traveling expenses, rentals, supplies, etc. | 5,812 18 | 5,667 58 |
| Sacramento district, salaries, traveling expenses, rentals, supplies, etc. | 3,973 88 | 4,383 43 |
| Los Angeles district, salaries, traveling expenses, rentals, supplies, etc. | 3,002 48 | 2,116 92 |
| Hatchery administration, salaries, traveling expenses, rentals, supplies, etc. | 813 18 | 876 55 |
| Fishery research and publicity, salaries, traveling expenses, supplies, etc. | 405 08 | 559 71 |
| Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc. | 450 98 | 510 46 |
| Fish transplanting, salaries, traveling expenses, supplies, etc. | 19 50 | 30 21 |
| Fish distribution cars (1 and 2) salaries, traveling expenses, rentals, supplies, etc. | 136 05 | 1,197 45 |
| Fish patrol launches, salaries, traveling expenses, supplies, etc. | 1,072 89 | 1,042 21 |
| Sisson Hatchery, salaries, traveling expenses, supplies, etc. | 2,580 85 | 2,577 95 |
| Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc. | 44 10 | 2 00 |
| Tahoe Hatcheries, salaries, traveling expenses, supplies, etc. | 437 78 | 505 15 |
| Price Creek Hatchery, salaries, traveling expenses, supplies, etc. | | |
| Utah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc. | 634 67 | 389 08 |
| Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc. | 298 79 | 408 89 |
| Bear Valley Hatchery, salaries, traveling expenses, supplies, etc. | 348 53 | 373 99 |
| Marlett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc. | 25 80 | 33 05 |
| Fort Seward Hatchery, salaries, traveling expenses, supplies, etc. | 879 44 | 261 94 |
| Inyo County Hatchery, salaries, traveling expenses, supplies, etc. | 4,759 06 | 387 58 |
| Almanor Station, salaries, traveling expenses, supplies, etc. | 236 33 | 247 69 |
| Game farm, salaries, traveling expenses, rentals, traveling expenses, supplies, etc. | 232 44 | 356 72 |
| Game research and publicity, salaries, traveling expenses, supplies, etc. | 197 20 | 199 67 |
| Prosecutions and allowances | 261 50 | 147 50 |
| Hunting license commissions and refunds | 570 00 | 1,551 90 |
| Anglers' license commissions and refunds | 957 60 | 1,735 70 |
| Market fishing license commissions and refunds | 178 50 | 122 50 |
| Crawfish and abalone inspection | 100 00 | 100 00 |
| Winter game feeding | | |
| Mountain lion bounties | 160 00 | 260 00 |
| Printing and lithographing | 1,227 09 | 164 50 |
| Claims paid account accidents | | |
| Totals | \$32,036 12 | \$28,410 30 |
| Balances: | | |
| Fish and Game Preservation Fund | \$63,597 27 | \$55,105 40 |
| Support and Maintenance Hatcheries Fund | 19,457 15 | 20,015 56 |
| Less monthly claims | \$83,054 42 | \$75,120 96 |
| | 32,036 12 | 28,410 30 |
| Balance available after monthly claims are paid | \$51,018 30 | \$46,680 66 |

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"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 2

San Francisco, January, 1916

Number 1



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1915 CALIFORNIA FISH AND GAME LAWS 1917

| WHITE SQUARES IN: Black Codes | DIS- TRICT | JAN. | FEB. | MAR. | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | SPECIAL LIMITS, ETC. |
|--|-----------------|------|------|------|-------|-----|------|------|------|-------|------|------|------|---|
| DEER | 1-13 | | | | | | | | | 15 | 16 | | | No Deer, Fawns or Spike Bucks. No Sale of Meat. Two Bucks per season. |
| | 2-3 | | | | | | | | | 14 | | | | |
| | 4 | | | | | | | | | | | | | |
| RABBITS, (COTTONTAIL and BRUSH) | A3 | | | | | | | | | | 15 | | | 15 per day. 30 per week. |
| TREE SQUIRRELS | A3 | | | | | | | | | | | | | 12 per season. |
| Elk, Antelope, Mountain Sheep | A3 | | | | | | | | | | | | | KILLING OF ELK A FELONY. |
| SEA OTTER | A3 | | | | | | | | | | | | | \$1,000 FINE. |
| Ducks, Geese, Brant, Mudhens | A3 | | | | | | | | | | 15 | | | Ducks and Geese 25 per day; 60 per week. Hens and and Black Sea Brant 12 per day; 24 per week. |
| WILSON SNIPER, BLACK BREASTED PLOVER YELLOW LEGS, GOLDEN PLOVER | A3 | | | | | | | | | | 15 | | | 15 per day. 30 per week. |
| Rail, Wood Duck, Wild Pigeon | A3 | | | | | | | | | | | | | |
| VALLEY and DESERT QUAIL | A3 | | | | | | | | | | 15 | | | 15 per day. 30 per week. |
| Mountain Quail or Grouse | 1-13 | | | | | | | | | | | | | 10 Mountain Quail per day; 30 per week. 1 Grouse per day; 8 per week. |
| | 2-3-4 | | | | | | | | | | 15 | | | |
| SAGE HEN | A3 | | | | | | | | | | | | | 4 per day. 8 per week. |
| DOVE | A3 | | | | | | | | | | | | | 15 per day. |
| TROUT | 23 | | | | | | | | | | | | | 20 Trout in one day in this or District One. other districts limit as in other districts. |
| WHITE FISH | 1-4 | | | | | | | | | | | | | No limit on White Fish. |
| TROUT OTHER THAN GOLDEN | 5 | | 15 | | | | | | | | | | 15 | 50 Fish or, 10 pounds and 1 Fish, or 3 Fish weighing 10 pounds or over per day. In District 2 from Dec. 15 to Feb. 14, 3 Fish per day. |
| | 1-3 | | | | | | | | | | | | | |
| GOLDEN TROUT | A3 | | | | | | | | 11 | | | | | 20 per day, 5 inch minimum length. |
| BLACK BASS | ***1-11 | | | | | | | | | | | | | 25 per day, 7 inch minimum length. No Sale. |
| | 2-4 | | | 2 | | | | | | | | | | |
| Sacramento Perch, Sunfish, Crappie | A3 | | | | | | | | | | | | | 25 per day. No Sale. |
| SALMON | A3 EXCEPT 15 | | | | | | | | | | | | | No closed season for hook, line or spear. 3 per day Sept. 25 to Nov. 14. Hook and line only in District 15. |
| | 15 | | | | 15 | | | | | | | | | |
| STRIPED BASS | A3 | | | | | | | | | | | | | 5 per day under 3 pounds any time. Not more than 5 per day Sept. 25 to Nov. 14. No sale nor shipment under 3 lbs. |
| CATFISH, SHAD | A3 | | | | | | | | | | | | | No closed season or size limit with hook and line for sport. |
| CRABS | A3 | | | | | | | 2 | | | | 21 | | To be taken with hoop or crab net only. No Females. None less than 7 inches. |
| SPINY LOBSTER (CRAWFISH) | A3 | | | | | | | | | | | 15 | | To be taken with crawfish trap only. None less than 9 inches nor more than 13 1/4 inches in length. |
| ABALONES Red Green, Pink, Black | A3 | | | | | | | | | | | | | Must measure: Red, 19 inches Green, 18 inches Pink, 16 inches Black, 14 inches. In Districts 19 and 20, daily limit of 10, but no Black. For food only. No drying. No spars. |

* All other waterfowl and shore birds are protected.
Waterfowl only may be shot in District 28.

HUNTERS' LICENSES

JULY 1st TO JUNE 30th

Obtain of County Clerks or Fish and Game
Commission or Deputies

| | |
|--------------------------------------|-----------------|
| CITIZENS, resident of California | \$1.00 per year |
| CITIZENS, non-resident of California | 10.00 per year |
| ALIENS, | 25.00 per year |

All shooting forbidden in districts, 24, 25, 26, 27, 29

ANGLERS' LICENSES

JANUARY 1st TO DECEMBER 31st

Obtain of County Clerks or Fish and Game
Commission or Deputies

| | |
|---|-----------------|
| CITIZENS, residents of California, over 18 years | \$1.00 per year |
| CITIZENS, non-resident of California, over 18 years | 3.00 per year |
| ALIENS, over 18 years | 3.00 per year |

For market fishing laws see special market fishing cards or booklets of laws in full.

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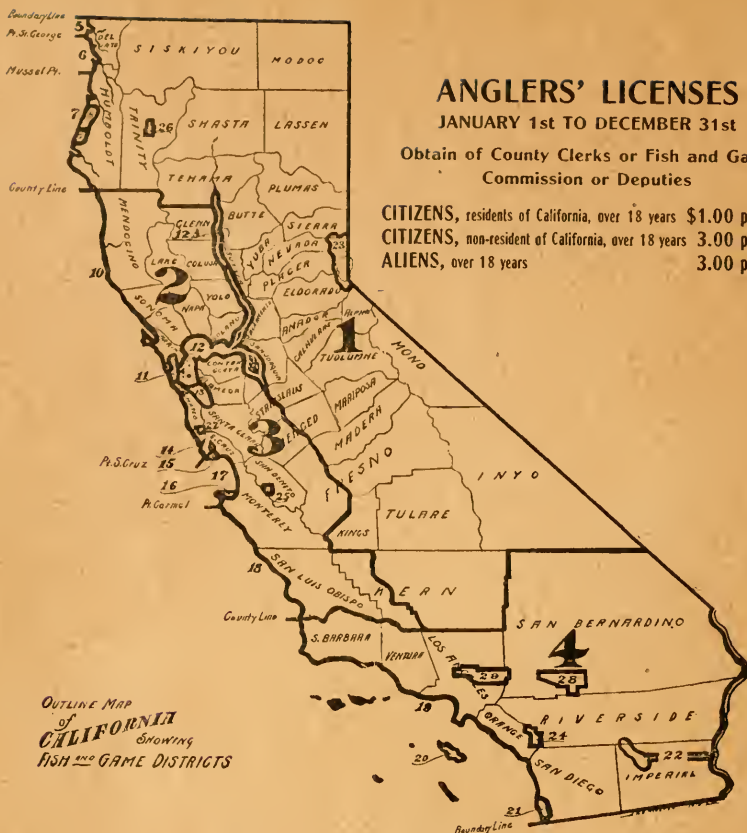
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CITIZENS, residents of California, over 18 years \$1.00 per year
CITIZENS, non-resident of California, over 18 years 3.00 per year
ALIENS, over 18 years 3.00 per year

ABSTRACT OF FISH LAWS (Sporting)

| | | | |
|--------------------------------------|---------------|---|--|
| TROUT | 23 | June 1 to Oct. 31 | 20 Tahoe trout in one day in this or Dist. 1; other varieties limit as in other districts. No limit on whitefish. |
| WHITEFISH | 1 and 4 | May 1 to Nov. 30 | 50 fish or 10 pounds and one fish, or 1 fish of 10 pounds or over per day. |
| TROUT (other than Golden) | 2 | May 1 to Nov. 30 Dec. 15 to Feb. 14 | In Dist. 2, from Dec. 15 to Feb. 14, 2 fish per day. |
| | 3 | May 1 to Oct. 31 | |
| GOLDEN TROUT | All | July 31 to Oct. 1 | 20 per day, 5 inches minimum length. |
| BLACK BASS | 1,2,12 | May 1 to Nov. 30 | 25 per day, 7 inches minimum length. No sale. |
| | 3, 4 | Mar. 2 to Nov. 30 | |
| SACRAMENTO PERCH, SUNFISH CRAPPIE | All | May 1 to Nov. 30 | 25 per day. No sale. |
| SALMON | All except 16 | No closed season for hook and line or spear | 3 per day from Sept. 25 to Nov. 14. Hook and line only in Dist. 15. |
| | 15 | Apr. 15 to Aug. 31 | |
| STRIPED BASS | All | No closed season | 5 per day under 3 pounds any time; not more than 5 per day from Sept. 25 to Nov. 14. No sale or shipment under 3 pounds. |
| CATFISH, SHAD | All | No closed season | No size limit for hook and line. |
| CRABS | All | Nov. 15 to July 30 | No females, and none less than 7 inches. |
| SPINY LOBSTER (Crawfish) | All | Oct. 15 to Feb. last | To be taken with crawfish traps only. None less than 9 nor more than 13½ inches in length. |
| ABALONE Red Green, Pink, Black | All | March 1 to Jan. 31 | Size limit: Red, 19 inches; Green, 18 inches. Pink, 16 inches; Black, 14 inches. Dist. 19 and 20, daily limit of 10, but no black. No drying and no spears. For food only. |
| | All | May 1 to Jan. 31 | |

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| R. C. O'Connor | Grass Valley | | |
| F. S. Parke | Sutter Creek | | |

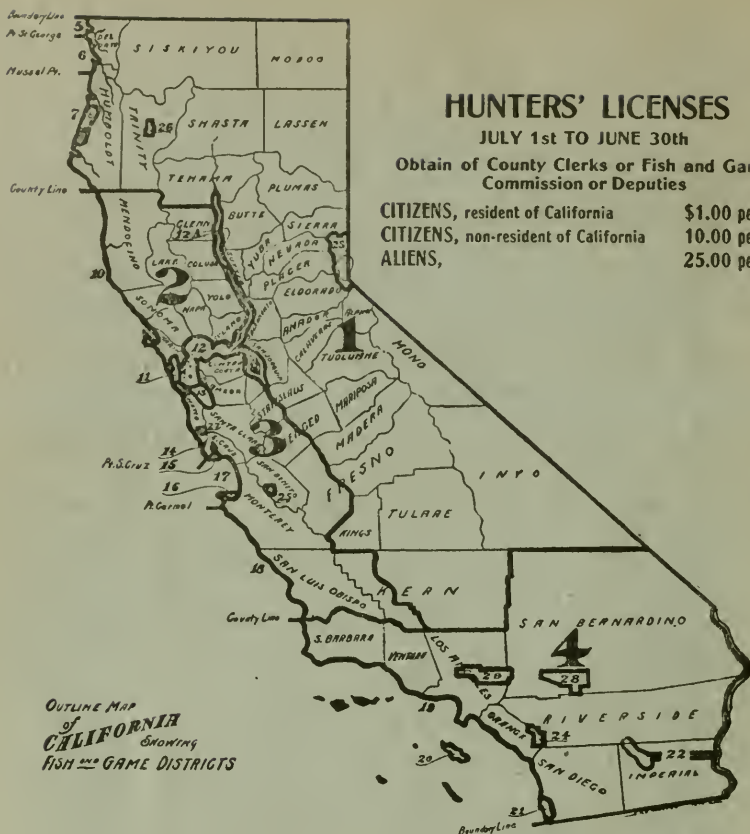
LOS ANGELES DIVISION.

M. J. Connell, Commissioner in Charge. H. I. Pritchard, Assistant.

Union League Building, Los Angeles.

Phones: Broadway 1155; Home, F 5705.

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| J. J. Barnett | Ventura | E. H. Ober | Big Pine |
| C. S. Bauder | San Luis Obispo | W. K. Robinson (on furlough) | El Toro |
| H. D. Becker | Los Angeles | A. J. Stout | Bakersfield |
| J. H. Gyger | Elsinore | Webb Toms | San Diego |
| W. C. Malone | San Bernardino | | |



| Variety | Dist. | Open Season (both dates included) | Bag limit, etc. |
|--|---------|--------------------------------------|--|
| DEER | 1, 23 | Aug. 15 to Oct. 14 | No does, fawns or spike bucks; no sale of meat. Two bucks per season. |
| | 2, 3 | Aug. 1 to Sept. 14 | |
| | 4 | Sept. 1 to Sept. 30 | |
| RABBITS (Cottontail and Brush) | All | Oct. 15 to Dec. 31 | 15 per day, 30 per week. |
| TREE SQUIRRELS | All | Sept. 1 to Dec. 31 | 12 per season. |
| ELK, ANTELOPE, MOUNTAIN SHEEP | All | No open season | Killing of elk a felony. |
| SEA OTTER | All | No open season | Penalty, \$1000.00 fine. |
| DUCKS, GEESE, BRANT, MUDHENS | All | Oct. 15 to Jan. 31 | Ducks and geese, 25 per day, 50 per week; honkers and sea brant, 12 per day, 24 per week. |
| WILSON SNIPES, BLACK BREASTED PLOVER, YELLOW LEGS, GOLDEN PLOVER | All | Oct. 15 to Jan. 31 | 15 per day, 30 per week. |
| RAIL, WOOD DUCK, WILD PIGEON | All | No open season | |
| VALLEY AND DESERT QUAIL | All | Oct. 15 to Dec. 31 | 15 per day, 30 per week. |
| MOUNTAIN QUAIL AND GROUSE | 1, 23 | Sept. 1 to Nov. 30 | 10 mountain quail per day, 20 per week; 4 grouse per day, 8 per week. |
| | 2, 3, 4 | Oct. 15 to Dec. 31 | |
| SAGE HEN | All | Sept. 1 to Nov. 30 | 4 per day, 8 per week. |
| DOVE | All | Sept. 1 to Nov. 30 | 15 per day. |

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 2

San Francisco, October, 1916

Number 4



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LOS ANGELES DIVISION.

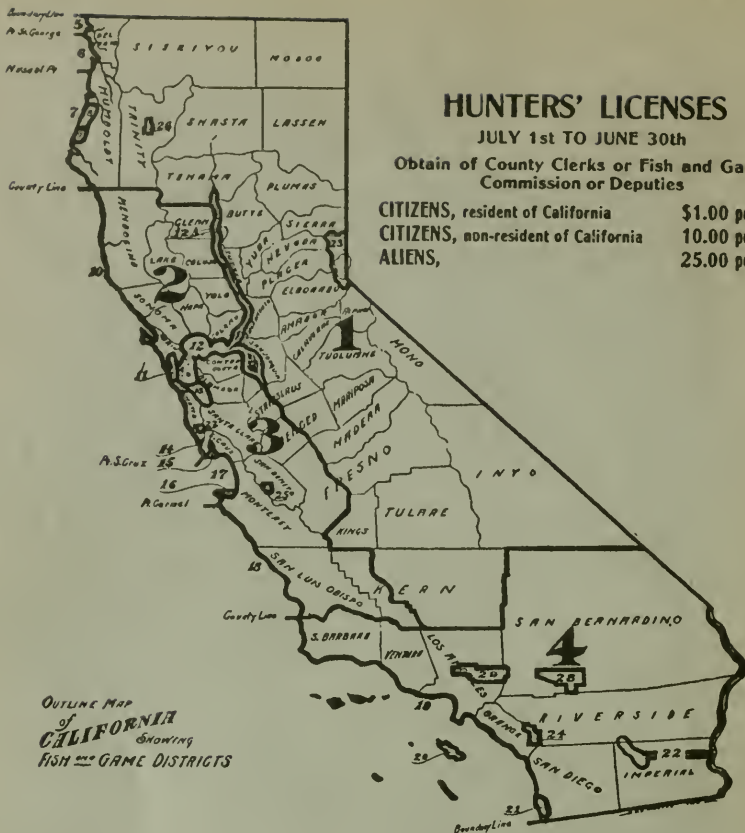
M. J. Connell, Commissioner in Charge.

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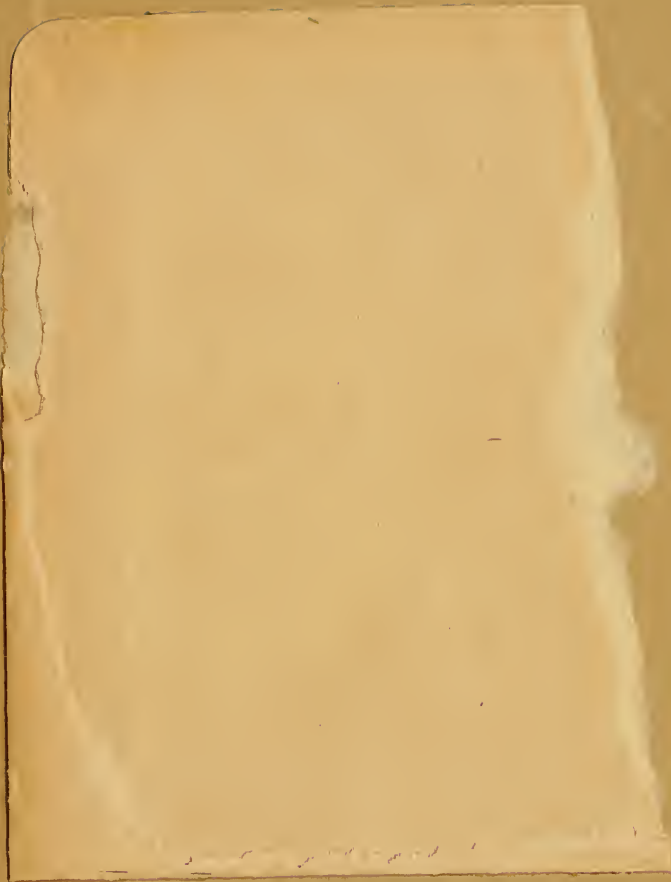


ABSTRACT OF GAME LAWS (Sporting)

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